

# INVESTIGATING SCHOOL MATHEMATICS

## WORKBOOK

TEACHERS' EDITION

QA

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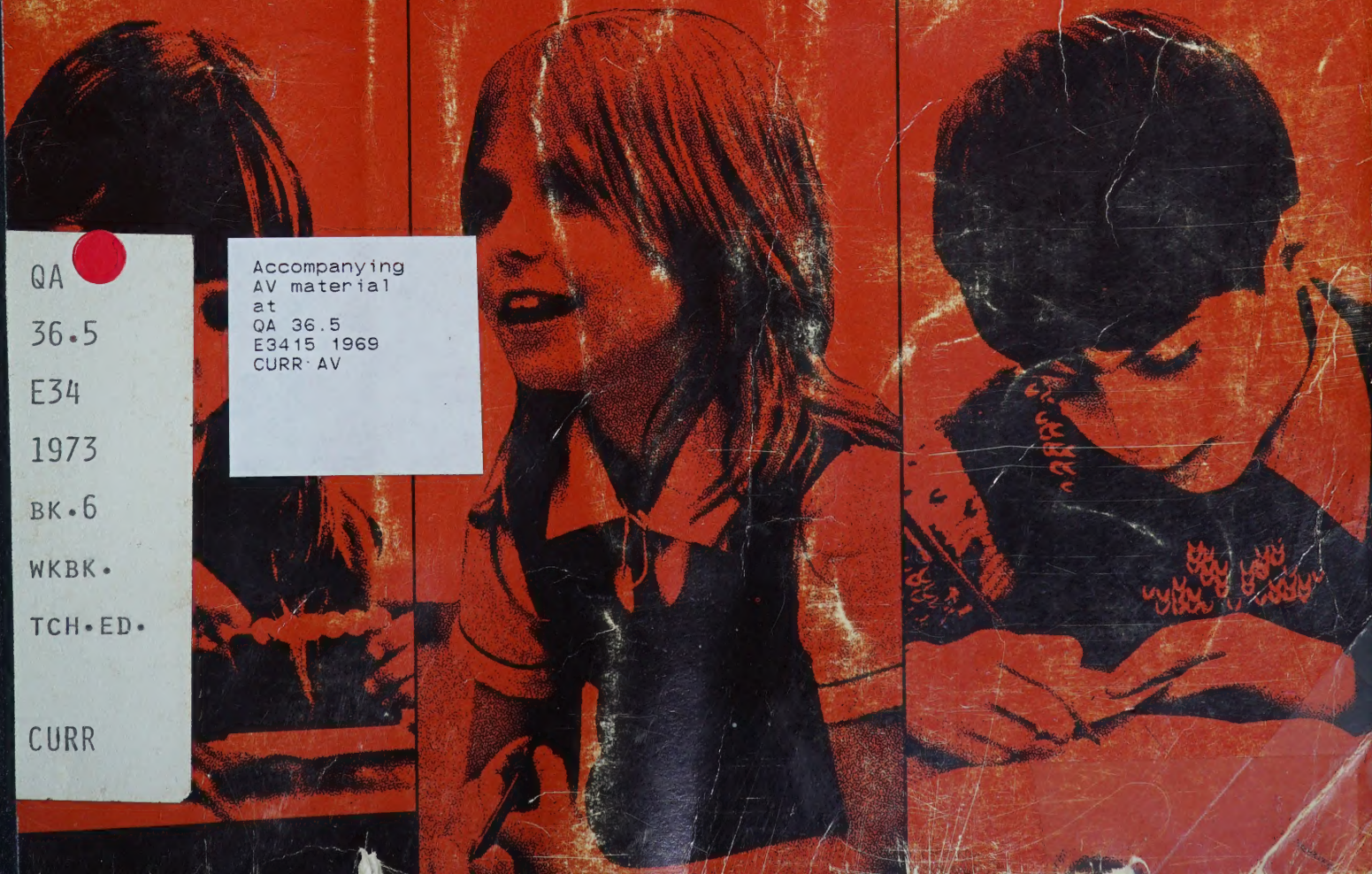
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# Investigating School Mathematics

**Workbook**

ROBERT E. EICHOLZ

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CHARLES R. FLEENOR

**TEACHERS' EDITION**



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ABCDEFG 80797877675



1. These letters can be printed using exactly 3 segments.

A K F  
H

These letters can be printed using more or less than 3 segments.

E O T  
W

Make 3 more printed letters using exactly 3 segments.

N Y Z

2. All of these words are "special."

one era  
ace use

None of these words are "special."

the eat  
bear of

Ring the "special" words in this set.

ask ice  
ore tea

3. All of these numbers are multiples of 9.

27 54 90  
63 702 9

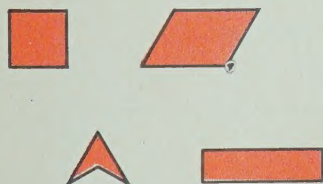
None of these numbers are multiples of 9.

7 16 40  
32 119 56

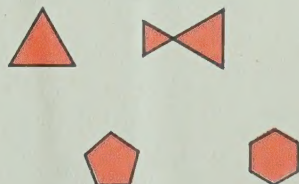
Ring the multiples of 9 in this set.

25 66 81  
39 108 75

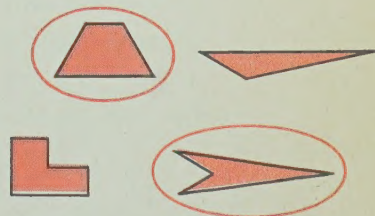
4. All of these regions are in a special set.



None of these regions are in the special set.



Ring the regions that are in the special set.



5. All of these fractions are "special."

$\frac{1}{5}$   $\frac{3}{3}$   $\frac{1}{2}$   $\frac{5}{8}$   
 $\frac{2}{4}$   $\frac{9}{16}$   $\frac{11}{12}$



















None of these fractions are "special."

$\frac{5}{10}$   $\frac{7}{21}$   $\frac{6}{8}$   $\frac{12}{16}$   
 $\frac{8}{12}$   $\frac{14}{32}$   $\frac{3}{3}$

Ring the "special" fractions in this set.

$\frac{4}{6}$   $\frac{3}{8}$   $\frac{6}{9}$   $\frac{13}{20}$   
 $\frac{9}{54}$   $\frac{4}{5}$   $\frac{17}{24}$



	TRIANGLES		CIRCLES		SQUARES	
	Large	Small	Large	Small	Large	Small
RED						
GRAY						
WHITE						

1. Write the name of the attribute piece that is described in each part.

A It is red.  
It is round.  
It is not small.

large red circle

B It is gray.  
It is a square.  
It is not large.

small gray square

C It has 3 sides.  
It is not large.  
It is red.

small red triangle

D It is not red.  
It is not white.  
It is not large.  
It is a square.

small gray square

E It is gray.  
It is not a square.  
It is large.  
It is not a circle.

large gray triangle










F It is small.  
It is not red.  
It is not gray.  
It is round.

small white circle

2. Fill in the table with the correct attribute pieces.

Down: Same size and shape










Across: Same color

3. Fill in the table with the correct attribute pieces.

Down: Same color and size

Across: Same shape



1. Find the pattern in each sequence. Then give the next three numbers in the sequence.

A 1, 4, 7, 10, 13, 16, 19

F 1, 3, 6, 9, 12, 15, 18

B 2, 4, 8, 16, 32, 64, 128

G 1, 11, 21, 31, 41, 51, 61

C 0, 6, 12, 18, 24, 30, 36

H 0, 7, 14, 21, 28, 35, 42

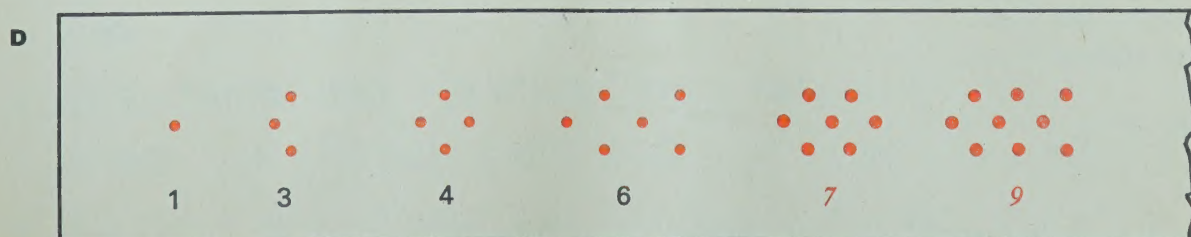
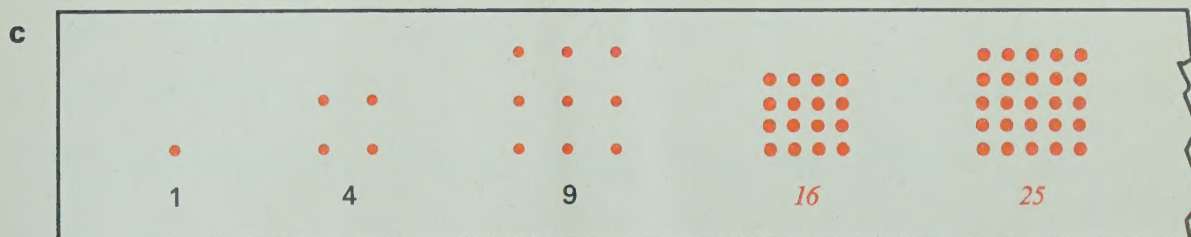
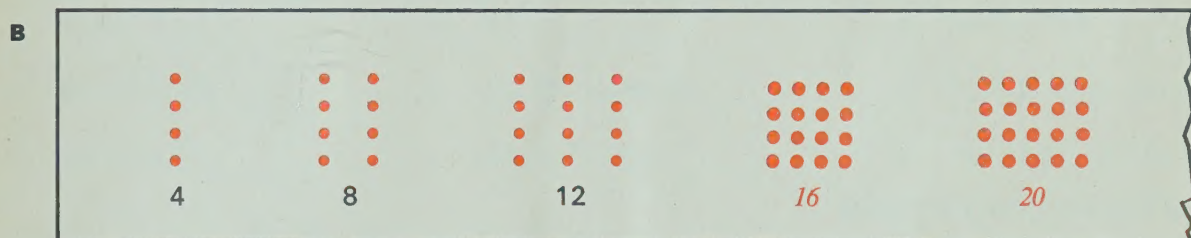
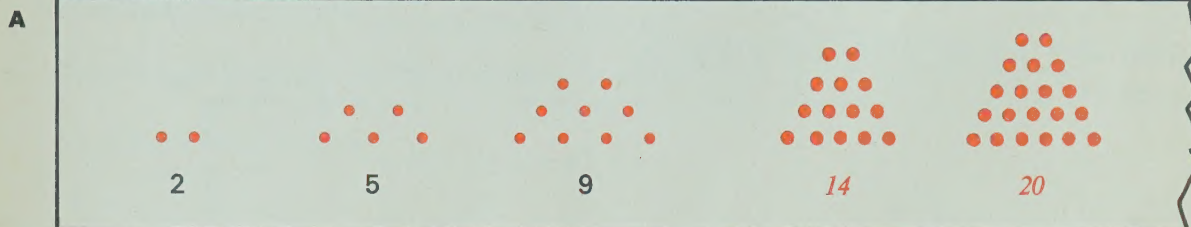
D 1, 12, 23, 34, 45, 56, 67

I 1, 2, 4, 5, 7, 8, 10, 11

E 1, 2, 4, 5, 7, 8, 10, 11, 13, 14

J 1, 4, 3, 6, 5, 8, 7, 10

2. Study the dot patterns. Show the next two dot patterns and give the numbers in each sequence.





1. Write the name of the attribute piece that is described in each part.

- A** It is gray.  
It is not large.  
It is neither a square nor a circle.

*small gray triangle*

- B** It is large.  
It is square.  
It is not red.  
It is not gray.

*large white square*

- C** It is round.  
It is not large.  
It is not red.  
It is not white.

*small gray circle*

2. All of these numbers have a special property.

24 18 15  
3 51  
12 75 39

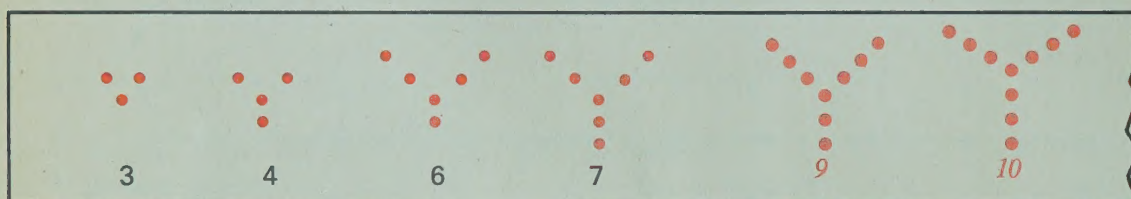
None of these numbers have the special property.

8 20 16  
25 11 100  
49 56

Which of these numbers have the special property?

14 37 21 13  
76 9 10

3. Give the next two dot patterns and numbers.



## CHANGE OF PACE

1. Think of the numbers in pairs as shown by the colored lines. Write the sum.

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = \underline{45}$$

2. Think about **all** the whole numbers from 1 to 19 paired as shown. Write the sum.

$$1 + 2 + 3 + \cdots + 9 + 10 + 11 + \cdots + 17 + 18 + 19 = \underline{190}$$

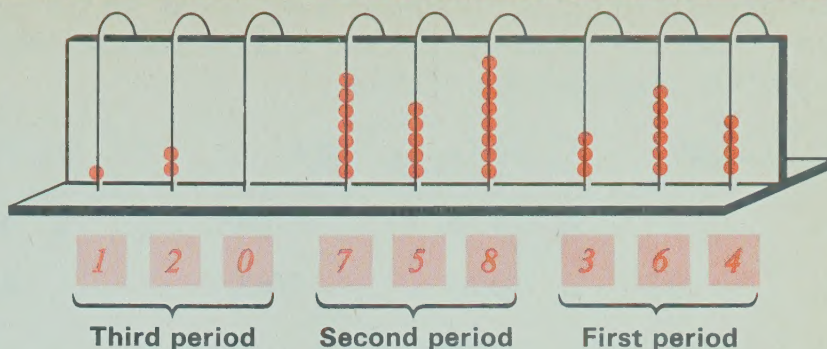
3. Think about **all** the whole numbers from 1 to 99. Write the sum.

$$1 + 2 + 3 + \cdots + 49 + 50 + 51 + \cdots + 97 + 98 + 99 = \underline{4950}$$

4. What is the sum of **all** the whole numbers from 1 to 49? 1225



1. Write the correct digit in each  to tell the number of beads in each place on the abacus.



2. A The **first period** of the numeral in exercise 1 contains the digits 3, 6, 4 and tells how many ones.
- B The **second period** of the numeral in exercise 1 contains the digits 7, 5, 8 and tells how many thousands.
- C The **third period** of the numeral in exercise 1 contains the digits 1, 2, 0 and tells how many millions.
3. For the numeral you wrote in exercise 1, give the digit for the following places.
- |                       |                           |                               |
|-----------------------|---------------------------|-------------------------------|
| A ones' <u>4</u>      | D tens' <u>6</u>          | G hundreds' <u>3</u>          |
| B thousands' <u>8</u> | E ten thousands' <u>5</u> | H hundred thousands' <u>7</u> |
| C millions' <u>0</u>  | F ten millions' <u>2</u>  | I hundred millions' <u>1</u>  |
4. Give the missing words and numbers.
- A 764: The 6 in the tens' place means  $6 \times$  10.
- B 928 456: The 8 in the thousands' place means  $8 \times$  1000.
- C 347 561 298: The 5 in the hundred thousands' place means  $5 \times$  100 000.
5. Give the correct sign ( $<$ ,  $>$ , or  $=$ ) for each
- A  $3489$   $(3 \times 1000) + (4 \times 100) + (8 \times 10) + 9$
- B  $5278$   $(5 \times 1000) + (3 \times 100) + (7 \times 10) + 8$
- C  $69\,543$   $(6 \times 10\,000) + (9 \times 1000) + (4 \times 100) + (4 \times 10) + 3$
- D  $302\,765$   $(3 \times 100\,000) + (2 \times 10\,000) + (7 \times 100) + (6 \times 10) + 5$



1. In each exercise, ring the number that is "closer" to the number shown in color. When the number in color is exactly halfway between the two numbers, ring the larger number.

- |               |                          |                             |
|---------------|--------------------------|-----------------------------|
| A 70, 74, 80  | E 200, 235, 300          | I 40 000, 48 655, 50 000    |
| B 50, 56, 60  | F 3000, 3657, 4000       | J 8000, 8500, 9000          |
| C 90, 93, 100 | G 8000, 8523, 9000       | K 400 000, 456 000, 500 000 |
| D 60, 65, 70  | H 60 000, 65 324, 70 000 | L 500 000, 542 375, 600 000 |

2. Ring the number that best completes the sentence.

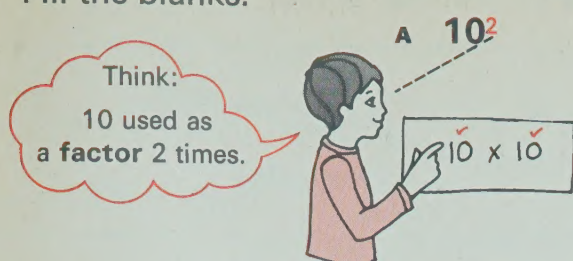
- A 59 364 rounded to the nearest ten is 59 360  
59 370
- B 59 364 rounded to the nearest hundred is 59 800  
59 400
- C 59 364 rounded to the nearest thousand is 59 000  
60 000
- D 676 499 rounded to the nearest thousand is 676 000  
677 000
- E 845 264 rounded to the nearest ten thousand is 840 000  
850 000
- F 6 362 800 rounded to the nearest hundred thousand is 6 300 000  
6 400 000
- G 8 500 001 rounded to the nearest million is 8 000 000  
9 000 000
- H 54 947 000 rounded to the nearest ten million is 50 000 000  
60 000 000

3. Give the missing numbers.

- |   |   |
|---|---|
| A 386 rounded to the nearest<br>10 is 390.        | D 967 582 rounded to the nearest<br>1000 is 968 000.            |
| B 87 643 rounded to the nearest<br>100 is 87 600. | E 8 647 386 rounded to the nearest<br>10 000 is 8 650 000.      |
| C 9550 rounded to the nearest<br>100 is 9600.     | F 868 576 321 rounded to the nearest<br>million is 869 000 000. |



1. Fill the blanks.



$$10^2 = \underline{10} \times \underline{10} = \underline{100}$$



$$10^3 = \underline{10} \times \underline{10} \times \underline{10} = \underline{1000}$$

2. Fill the blanks.

A For  $10^4$ , we think of 10 used as a factor 4 times.

$$10^4 = \underline{10 \times 10 \times 10 \times 10} = \underline{10\,000}$$

B For  $10^5$ , we think of 10 used as a factor 5 times.

$$10^5 = \underline{10 \times 10 \times 10 \times 10 \times 10} = \underline{100\,000}$$

C For  $10^6$ , we think of 10 used as a factor 6 times.

$$10^6 = \underline{10 \times 10 \times 10 \times 10 \times 10 \times 10} = \underline{1\,000\,000}$$

3. Write as many zeros after the 1 as the exponent indicates. Then check to see if the equations are correct.

A  $10^1 = \underline{10}$

C  $10^3 = \underline{1000}$

E  $10^5 = \underline{100\,000}$

B  $10^2 = \underline{100}$

D  $10^4 = \underline{10\,000}$

F  $10^6 = \underline{1\,000\,000}$

4. Find the products.

A  $4 \times 10^1 = \underline{40}$

D  $5 \times 10^4 = \underline{50\,000}$

G  $32 \times 10^3 = \underline{32\,000}$

B  $7 \times 10^2 = \underline{700}$

E  $9 \times 10^5 = \underline{900\,000}$

H  $16 \times 10^2 = \underline{1600}$

C  $26 \times 10^1 = \underline{260}$

F  $41 \times 10^2 = \underline{4100}$

I  $50 \times 10^4 = \underline{500\,000}$

5. Find a number less than 10 for each blank. Give the missing exponents in each  .

A  $300 = \underline{3} \times 10^{\text{2}}$

D  $6000 = \underline{6} \times 10^{\text{3}}$

G  $700\,000 = \underline{7} \times 10^{\text{5}}$

B  $4000 = \underline{4} \times 10^{\text{3}}$

E  $20\,000 = \underline{2} \times 10^{\text{4}}$

H  $9\,000\,000 = \underline{9} \times 10^{\text{6}}$


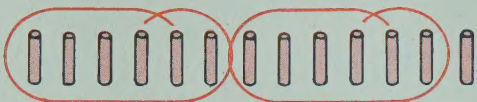
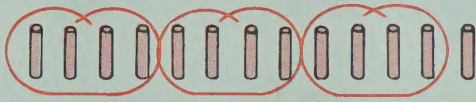
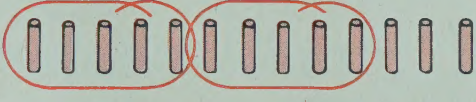
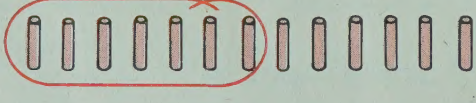
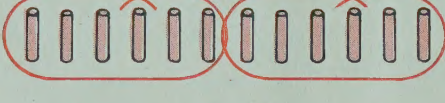
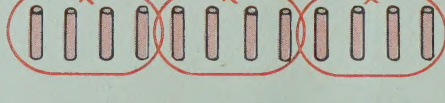
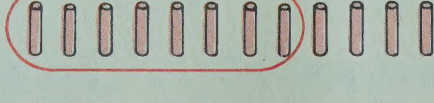
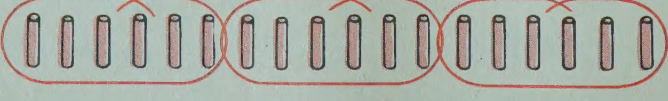
C  $800 = \underline{8} \times 10^{\text{2}}$

F  $500\,000 = \underline{5} \times 10^{\text{5}}$

I  $1\,000\,000 = \underline{1} \times 10^{\text{6}}$

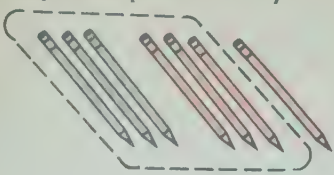



Draw rings to group the sticks as indicated. Then fill the blanks.

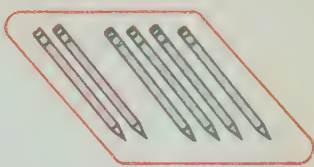
1. In **BASE EIGHT**,  
group by **eights**.  1 eight and 5  
We write 15<sub>(8)</sub>.
2. In **BASE SIX**,  
group by **sixes**.  2 sixes and 1  
We write 21<sub>(6)</sub>.
3. In **BASE FOUR**,  
group by **fours**.  3 fours and 1  
We write 31<sub>(4)</sub>.
4. In **BASE FIVE**,  
group by **fives**.  2 fives and 3  
We write 23<sub>(5)</sub>.
5. In **BASE SEVEN**,  
group by **sevens**.  1 seven and 6  
We write 16<sub>(7)</sub>.
6. In **BASE SIX**,  
group by **sixes**.  2 sixes and 0  
We write 20<sub>(6)</sub>.
7. In **BASE FOUR**,  
group by **fours**.  3 fours and 0  
We write 30<sub>(4)</sub>.
8. In **BASE EIGHT**,  
group by **eights**.  1 eight and 4  
We write 14<sub>(8)</sub>.
9. In **BASE SIX**,  
group by **sixes**.  3 sixes and 0  
We write 30<sub>(6)</sub>.




1. Group the pencils by sixes. Then give the sums.


A   
 $3_{(6)} + 4_{(6)} = \underline{11}_{(6)}$


B   
 $5_{(6)} + 5_{(6)} = \underline{14}_{(6)}$

C   
 $2_{(6)} + 4_{(6)} = \underline{10}_{(6)}$

2. Group the pencils by sixes. Then give the products.

A   
 3 groups of 3  
 $3_{(6)} \times 3_{(6)} = \underline{13}_{(6)}$

B   
 4 groups of 2  
 $4_{(6)} \times 2_{(6)} = \underline{12}_{(6)}$

C   
 2 groups of 5  
 $2_{(6)} \times 5_{(6)} = \underline{14}_{(6)}$

3. Complete the base-six addition and multiplication tables.

A

+	0	1	2	3	4	5
0	0	1	2	3	4	5
1	1	2	3	4	5	10
2	2	3	4	5	10	11
3	3	4	5	10	11	12
4	4	5	10	11	12	13
5	5	10	11	12	13	14

B

$\times$	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	10	12	14
3	0	3	10	13	20	23
4	0	4	12	20	24	32
5	0	5	14	23	32	41

4. Complete the counting in base six to  $30_{(6)}$ .

$1_{(6)}$ ,  $2_{(6)}$ ,  $3_{(6)}$ ,  $\underline{4_{(6)}}$ ,  $\underline{5_{(6)}}$ ,  $\underline{10_{(6)}}$ ,  $11_{(6)}$ ,  $\underline{12_{(6)}}$ ,  $\underline{13_{(6)}}$ ,  
 $\underline{14_{(6)}}$ ,  $\underline{15_{(6)}}$ ,  $20_{(6)}$ ,  $\underline{21_{(6)}}$ ,  $\underline{22_{(6)}}$ ,  $\underline{23_{(6)}}$ ,  $\underline{24_{(6)}}$ ,  $\underline{25_{(6)}}$ ,  $30_{(6)}$

5. Find the sums and differences. Use base-six numerals.

A 
$$\begin{array}{r} 5_{(6)} \\ + 2_{(6)} \\ \hline 11_{(6)} \end{array}$$

B 
$$\begin{array}{r} 10_{(6)} \\ - 3_{(6)} \\ \hline 3_{(6)} \end{array}$$

C 
$$\begin{array}{r} 15_{(6)} \\ + 5_{(6)} \\ \hline 24_{(6)} \end{array}$$

D 
$$\begin{array}{r} 21_{(6)} \\ - 4_{(6)} \\ \hline 13_{(6)} \end{array}$$

E 
$$\begin{array}{r} 34_{(6)} \\ + 3_{(6)} \\ \hline 41_{(6)} \end{array}$$

F 
$$\begin{array}{r} 52_{(6)} \\ - 3_{(6)} \\ \hline 45_{(6)} \end{array}$$







1. Write an equation for each picture. (*Answers may vary.*)



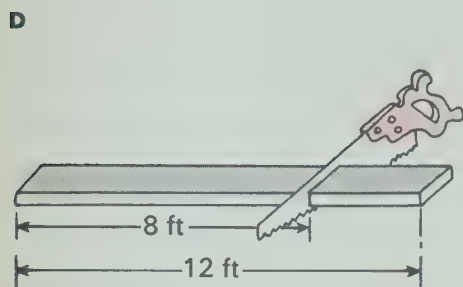
$$8 + 3 = 11$$



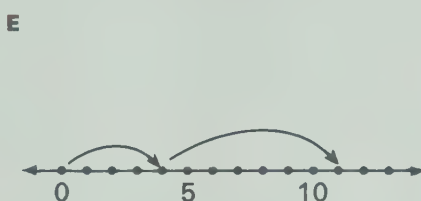
$$25 - 15 = 10$$



$$4 \times 5 = 20$$



$$12 - 8 = 4$$



$$4 + 7 = 11$$



40 apples. Same amount in each bag.

$$40 \div 5 = 8$$

2. Write **A**, **S**, **M**, or **D** to show which operation (**A**ddition, **S**ubtraction, **M**ultiplication, or **D**ivision) you would use to solve each problem.

- A** blocks to school.  
Walk this distance  
 times a day.

Walk how many blocks? **M**

- D** Ken had cents.  
He spent cents.

How many cents left? **S**

- B** Peg had records.  
She bought more.

How many records now? **A**

- E** majorettes.  
 band members.

How many in all? **A**

- C** There are boys  
and candy bars.  
How many candy bars

for each boy? **D**

- F** theatre rows.  
 seats in each row.  
How many seats are

in the theatre? **M**



1. You can subtract by finding the missing addend. Write the correct answer in the box.

Sum	Addend	Addend
16	- 7	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">9</div>



$? + 7 = 16$

2. Find the differences by thinking about missing addends.

S	A	A
A	18 - 9	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">9</div>

S	A	A
D	17 - 8	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">9</div>

S	A	A
G	13 - 8	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">5</div>

S	A	A
B	16 - 8	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

S	A	A
E	16 - 9	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">7</div>

S	A	A
H	14 - 6	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

S	A	A
C	15 - 7	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

S	A	A
F	13 - 5	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

S	A	A
I	10 - 0	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">10</div>

3. You can divide by finding the missing factor. Write the correct answer in the box.

Product	Factor	Factor
56	÷ 7	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>



$? \times 7 = 56$

4. Find the quotients by thinking about missing factors.

P	F	F
A	24 ÷ 8	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">3</div>

P	F	F
D	27 ÷ 3	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">9</div>

P	F	F
G	49 ÷ 7	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">7</div>

P	F	F
B	36 ÷ 6	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">6</div>

P	F	F
E	35 ÷ 5	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">7</div>

P	F	F
H	32 ÷ 4	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

P	F	F
C	54 ÷ 9	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">6</div>

P	F	F
F	0 ÷ 4	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">0</div>

P	F	F
I	72 ÷ 9	=
		<div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">8</div>

5. Solve the equations.

A  $3 + 7 = \underline{10}$

D  $15 + \underline{7} = 22$

G  $19 - \underline{9} = 10$

B  $6 \times 5 = \underline{30}$

E  $\underline{4} = 13 - 9$

H  $63 \div 9 = \underline{7}$

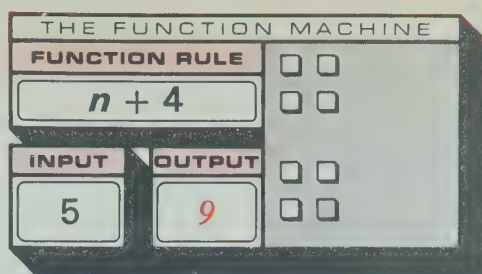
C  $3 \times \underline{7} = 21$

F  $64 \div \underline{8} = 8$

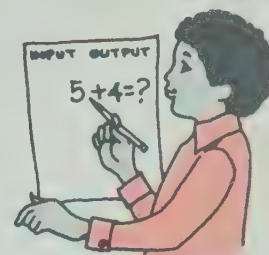
I  $4 \times \underline{8} = 32$



1. Give the correct output number in the space on the function machine.



Use 5 for  $n$  in the function rule.



2. Fill the blanks.

- A Using the words **output** and **input**, we can describe the function rule

above by writing “ input number + 4 = output number.”

- B Using  $n$  for “input number” and  $f(n)$  for “output number,” we describe

the function rule above by writing “  $n$  + 4 =  $f(n)$ .”

3. Use the rule on the function machine above to find the output number  $f(n)$  for each input number  $n$  that is given.

A  $n = 6$ ;  $f(n) = \underline{10}$

B  $n = 0$ ;  $f(n) = \underline{4}$

C  $n = 9$ ;  $f(n) = \underline{13}$

4. Think about different rules on the function machine and complete the tables.

A

function rule	
$7 + n$	
INPUT	OUTPUT
$n$	$f(n)$
3	10
5	12
6	13
8	15

B

function rule	
$4 \times n$	
INPUT	OUTPUT
$n$	$f(n)$
2	8
4	16
6	24
7	28

C

function rule	
$n + 10$	
INPUT	OUTPUT
$n$	$f(n)$
5	15
7	17
10	20
9	19

D

function rule	
$n \times 7$	
INPUT	OUTPUT
$n$	$f(n)$
0	0
3	21
5	35
7	49

E

function rule	
$n \times 9$	
INPUT	OUTPUT
$n$	$f(n)$
3	27
0	0
1	9
2	18

F

function rule	
$n \times 10$	
INPUT	OUTPUT
$n$	$f(n)$
3	30
5	50
9	90
10	100

G

function rule	
$(n + 3) \times 2$	
INPUT	OUTPUT
$n$	$f(n)$
4	14
6	18
3	12
0	6

H

function rule	
$5 \times (n + 6)$	
INPUT	OUTPUT
$n$	$f(n)$
2	40
4	50
0	30
14	100



The flowcharts can help you find special products.



$$8 \times 30 = 24 \times 10 = 240$$



$$20 \times 30 = 6 \times 100 = 600$$

1. Solve the equations.

A  $3 \times 40 = 3 \times 4 \times 10 = \underline{120}$

E  $30 \times 40 = 3 \times 10 \times 4 \times 10 = \underline{1200}$

B  $5 \times 60 = 5 \times 6 \times 10 = \underline{300}$

F  $40 \times 20 = 4 \times 10 \times 2 \times 10 = \underline{800}$

C  $4 \times 80 = 4 \times 8 \times 10 = \underline{320}$

G  $70 \times 40 = 7 \times 10 \times 4 \times 10 = \underline{2800}$

D  $5 \times 90 = 5 \times 9 \times 10 = \underline{450}$

H  $80 \times 10 = 8 \times 10 \times 1 \times 10 = \underline{800}$

2. Solve the first equation. Then use the result to help you solve the second equation.

A Since  $5 \times 70 = \underline{350}$ ,

C Since  $90 \times 7 = \underline{630}$ ,

E Since  $50 \times 80 = \underline{4000}$ ,

then  $350 \div 5 = \underline{70}$ .

then  $630 \div 7 = \underline{90}$ .

then  $4000 \div 80 = \underline{50}$ .

B Since  $6 \times 80 = \underline{480}$ ,

D Since  $40 \times 60 = \underline{2400}$ ,

F Since  $30 \times 50 = \underline{1500}$ ,

then  $480 \div 6 = \underline{80}$ .

then  $2400 \div 60 = \underline{40}$ .

then  $1500 \div 50 = \underline{30}$ .

3. Find the products and quotients.

A  $450 \div 9 = \underline{50}$

D  $8 \times 90 = \underline{720}$

G  $10^1 \times 10^2 = \underline{1000}$

B  $7 \times 80 = \underline{560}$

E  $40 \times 20 = \underline{800}$

H  $(3 \times 10^1) \times (5 \times 10^3) = \underline{150\,000}$

C  $1600 \div 40 = \underline{40}$

F  $8100 \div 90 = \underline{90}$

I  $420 \div 60 = \underline{7}$



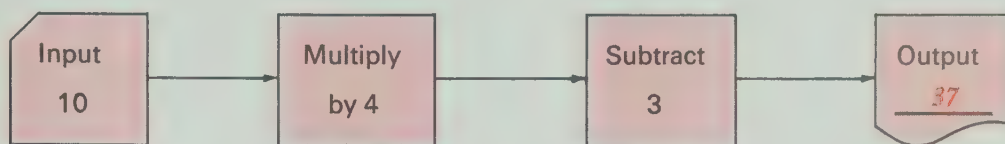
If 10 is multiplied by 4  
and 3 is subtracted  
from the product, what  
is the resulting number?



Mark

This problem is  
really hard!

1. A flow chart can help Mark how to solve the problem.  
Write the output number in the output box.



2. Writing an **equation** for the problem is another way to  
organize the information given in the problem.

Solve the equation for  $n$ .  $(10 \times 4) - 3 = n$        $n = \underline{37}$

3. Give the missing number in each output box. Then write an equation  
to describe the problem given in each flow chart.

				EQUATION
A	<pre> graph LR     Input[Input 33] --&gt; Divide[Divide by 3]     Divide --&gt; Subtract[Subtract 1]     Subtract --&gt; Output[Output 10]                     </pre>			$(33 \div 3) - 1 = n$
B	<pre> graph LR     Input[Input 28] --&gt; Subtract[Subtract 8]     Subtract --&gt; Divide[Divide by 4]     Divide --&gt; Output[Output 5]                     </pre>			$(28 - 8) \div 4 = n$
C	<pre> graph LR     Input[Input 10] --&gt; Add[Add 6]     Add --&gt; Multiply[Multiply by 2]     Multiply --&gt; Output[Output 32]                     </pre>			$(10 + 6) \times 2 = n$

4. Write an equation for each part. Then solve the equation.

- A Find the number that is 6 less  
than the product of 7 and 8.

Equation:  $(7 \times 8) - 6 = n$

Solution:  $n = 50$

- B Find the product of 9 times the  
difference of 13 and 8.

Equation:  $(13 - 8) \times 9 = n$

Solution:  $n = 45$



1. Complete the function table.

function rule

$$f(n) = (6 \times n) + 7$$

$n$	$f(n)$
2	19
0	7
4	31
8	55
7	49

2. Function rule:  $f(n) = (3 \times n) - 1$

If  $n = 10$ , then  $f(n) = \underline{29}$ .

3. Solve the equations. Think about missing addends.

S      A      A      S      A      A

A  $16 - 9 = \boxed{7}$       B  $52 - 49 = \boxed{3}$

4. Solve the equations. Think about missing factors.

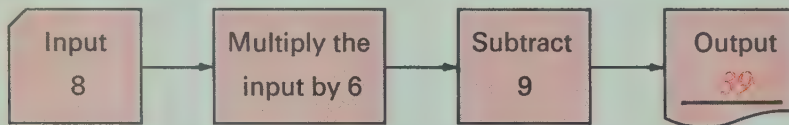
F      F      F      P      F      F      P      F      F

A  $56 \div 8 = \boxed{7}$       B  $90 \div 10 = \boxed{9}$       C  $8 \div 8 = \boxed{1}$       D  $0 \div 6 = \boxed{0}$

5. Find the products and quotients.

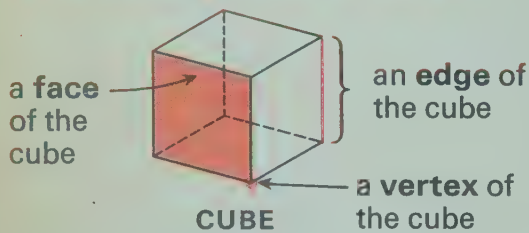
A  $8 \times 70 = \underline{560}$       B  $560 \div 8 = \underline{70}$       C  $60 \times 70 = \underline{4200}$       D  $52 \times 10^2 = \underline{5200}$

6. Give the missing number in the output box. Then write an equation to describe the problem in the flowchart.



$(8 \times 6) - 9 = n$

## CHANGE OF PACE



1. Complete this table.

Figure	Number of Vertices <b>V</b>	Number of Faces <b>F</b>	<b>V + F</b>	Number of Edges <b>E</b>
Cube	8	6	14	12
Triangular pyramid	4	4	8	6
Rectangular pyramid	5	5	10	8
Octahedron	6	8	14	12

2. It seems to be true that for any figure such as these,

$V + F = E + \boxed{2}$

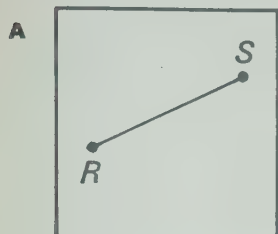


# 4

## Geometry and Measurement I

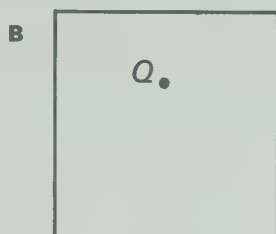
### Drawing and Naming Geometric Figures

1. Give the name of each geometric figure and the symbol used to represent the figure.



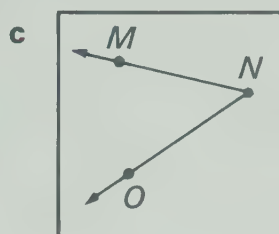
Name: Segment

Symbol:  $\overline{RS}$



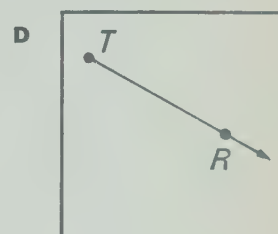
Name: Point

Symbol:  $Q$



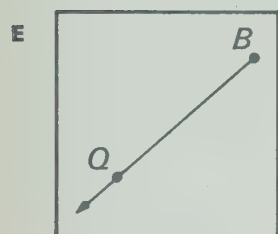
Name: Angle

Symbol:  $\angle MNO$



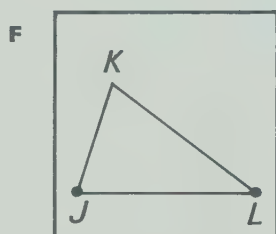
Name: Ray

Symbol:  $\overrightarrow{TR}$



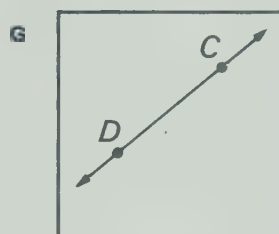
Name: Ray

Symbol:  $\overrightarrow{BQ}$



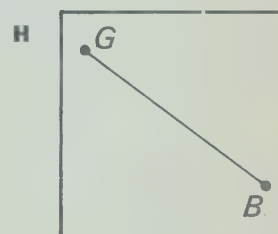
Name: Triangle

Symbol:  $\triangle JKL$



Name: Line

Symbol:  $\overleftrightarrow{DC}$



Name: Segment

Symbol:  $\overline{GB}$

2. In each box, draw and label a figure for each symbol.

$\angle CDE$ 	$\overline{NP}$ 	$\overrightarrow{RS}$ 
$\triangle PQR$ 	$\overleftrightarrow{ST}$ 	$\overline{BA}$ 



Study the steps in the exercises below. Then draw the space figures in the space provided at the right.

**1. Cube**

Draw a square.

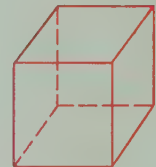


Draw another square.



Connect the corners. Dot the hidden edges.

Draw a cube here.



**2. Triangular Pyramid**

Draw a triangle.

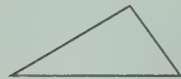


Draw a dot above it.



Connect the dot to the corners. Dot the hidden edges.

Draw a triangular pyramid here.



**3. Cone**

Draw an oval.

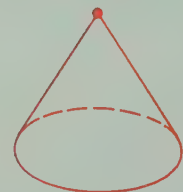


Draw a dot above it.



Connect the dot to the oval. Dot the hidden edge.

Draw a cone here.



**4. Cylinder**

Draw an oval.

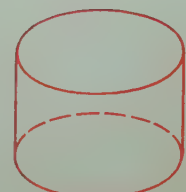
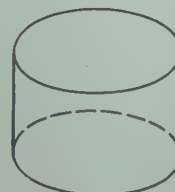
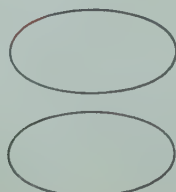


Draw another oval.



Connect the ovals. Dot the hidden edge.

Draw a cylinder here.

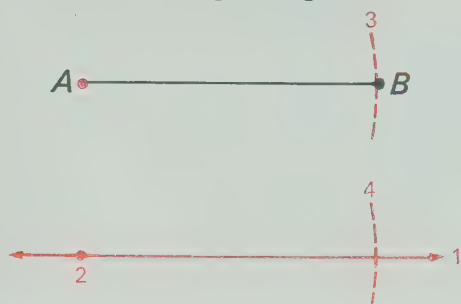




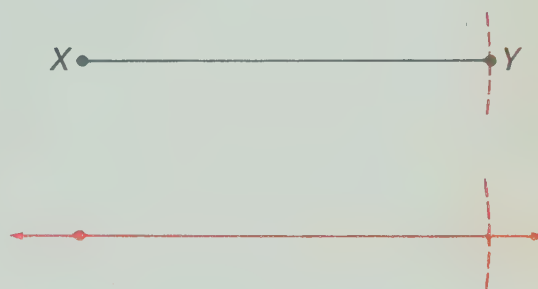
## ● Constructing Congruent Geometric Figures

Study the examples in each exercise before trying to do the constructions. The colored dots show where to put your compass point, and the colored numerals show the order of construction.

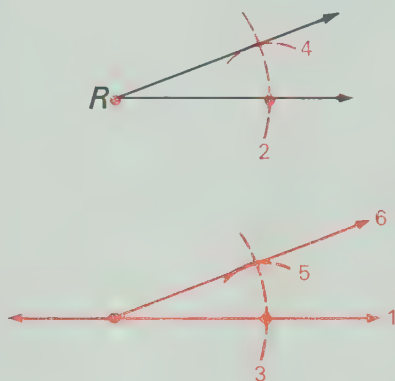
### 1. Example: Copying a segment



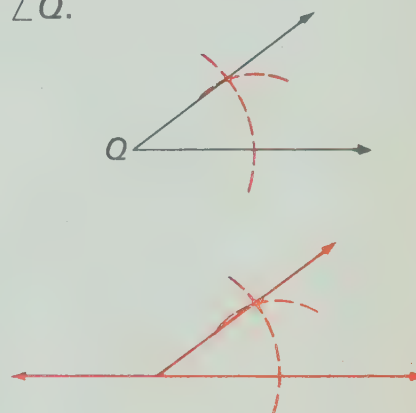
### Copy $\overline{XY}$ .



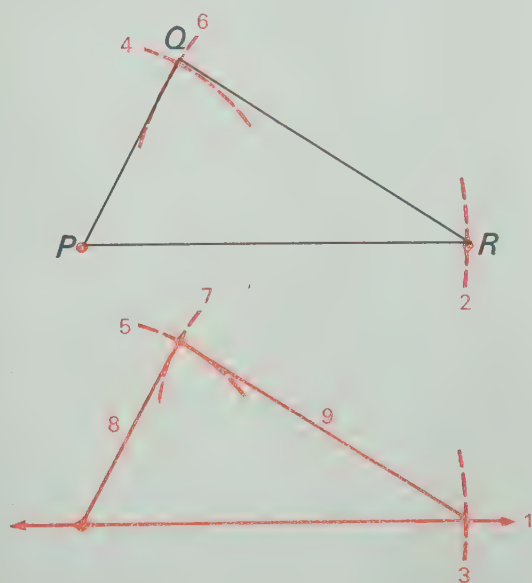
### 2. Example: Copying an angle



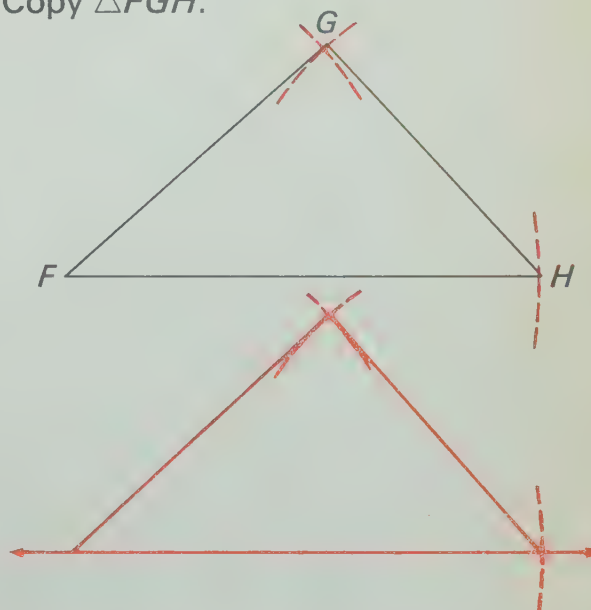
### Copy $\angle Q$ .



### 3. Example: Copying a triangle

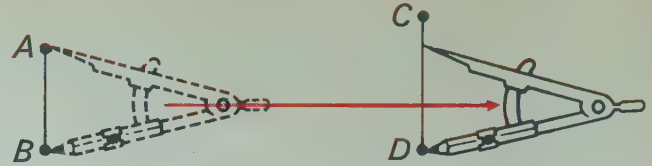


### Copy $\triangle FGH$ .

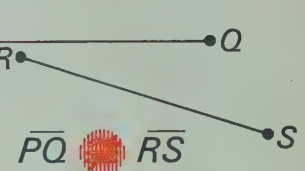
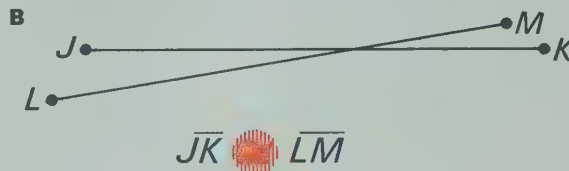


1. Two segments are **congruent** ( $\cong$ ) if their end points are equally far apart.

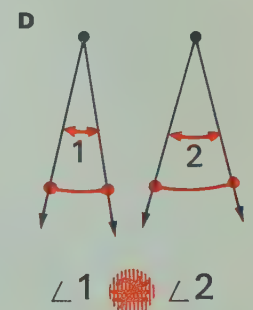
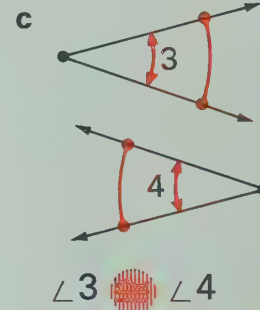
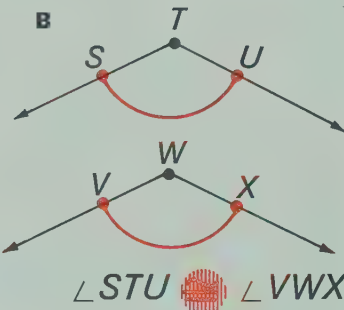
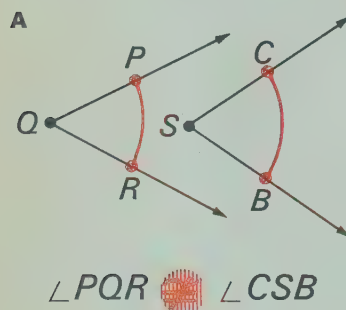
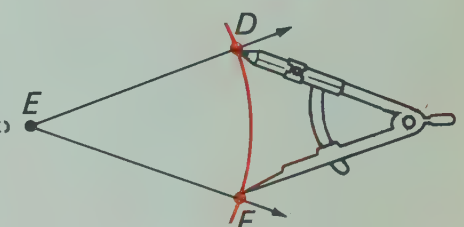
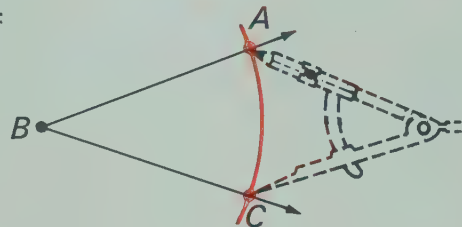
Is  $\overline{AB} \cong \overline{CD}$  ? No



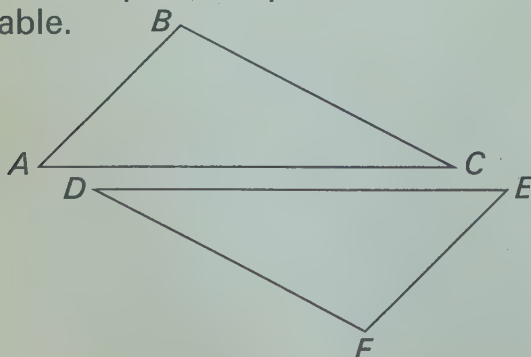
2. In each part, use your compass to find out whether or not the two segments are congruent. Write  $\cong$  or  $\not\cong$  (not congruent) in each



3. Two angles are **congruent** if "corresponding points" on their rays are equally far apart. Use your compass to find out whether or not the two angles are congruent. Write  $\cong$  or  $\not\cong$  in each



4. Two triangles are **congruent** if the parts (angles and segments) of one can be matched with the parts of the other. Use your compass and tracing paper to tell which parts of  $\triangle ABC$  and  $\triangle DEF$  are congruent to each other as you complete the table.



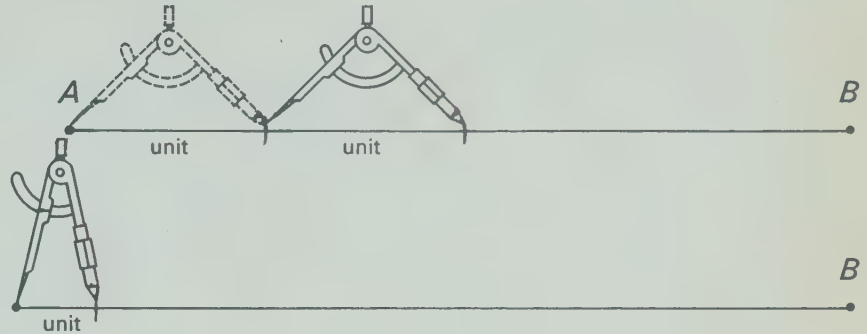
This part of triangle $ABC$		this part of triangle $DEF$ .
$\overline{AB}$	$\cong$	$\overline{EF}$
$\overline{AC}$	$\cong$	$\overline{ED}$
$\overline{BC}$	$\cong$	$\overline{FD}$
$\angle CAB$	$\cong$	$\angle DEF$
$\angle CBA$	$\cong$	$\angle DFE$
$\angle ACB$	$\cong$	$\angle EDF$



1. You can find the **length** of a segment by marking off segments congruent to a given unit and then counting the units. In each part, use your compass to mark off on  $\overline{AB}$  as many segments congruent to the unit as you can. Then write the length of  $\overline{AB}$  (to the nearest unit) in each blank.

A Unit: \_\_\_\_\_

Length: 4 units



B Unit: \_\_\_\_\_

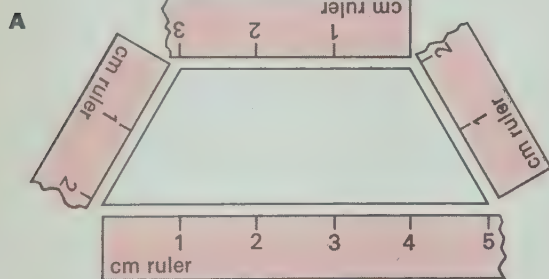
Length: 11 units

C Unit: \_\_\_\_\_

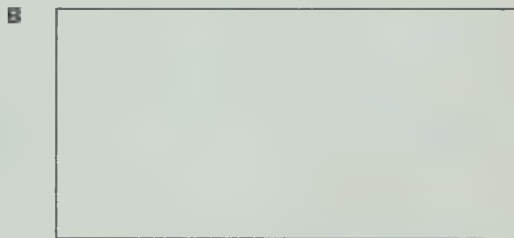
Length: 9 units



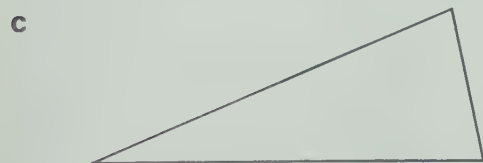
2. You can think of **perimeter** of a closed figure as the "distance around" the figure. In each part, find the perimeter in centimetres.



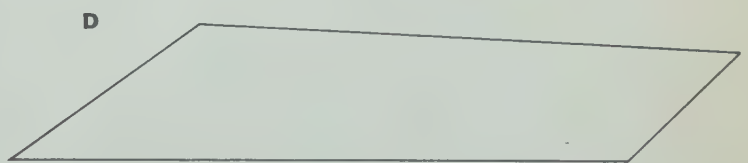
Perimeter: 12 cm



Perimeter: 18 cm



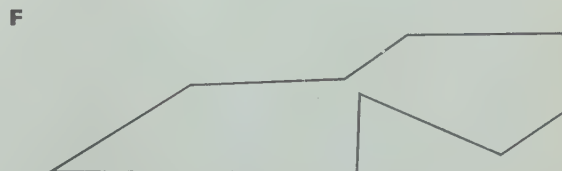
Perimeter: 12 cm



Perimeter: 20 cm

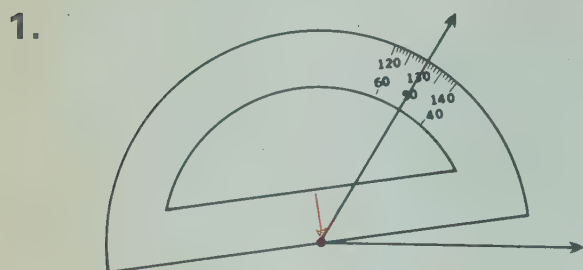


Perimeter: 14 cm



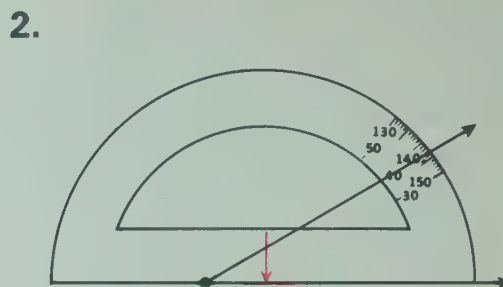
Perimeter: 16 cm

Each exercise shows an **incorrect** procedure to measure an angle. Use your protractor to give the **correct** measure.



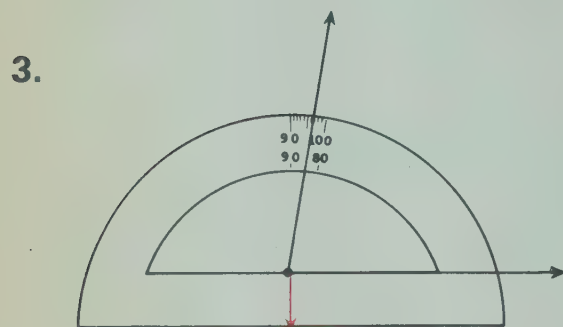
The answer  $50^\circ$  is **incorrect**.

The correct measure is  $60^\circ$ .



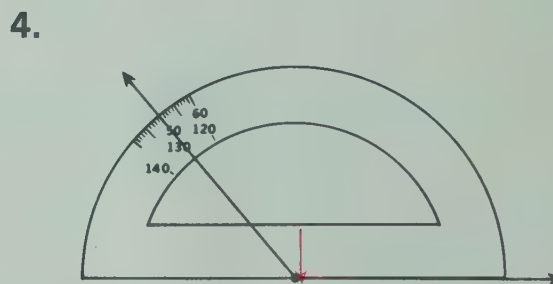
The answer  $40^\circ$  is **incorrect**.

The correct measure is  $30^\circ$ .



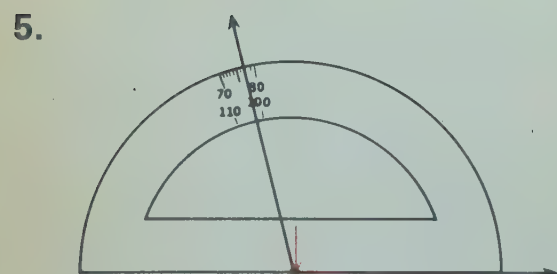
The answer  $84^\circ$  is **incorrect**.

The correct measure is  $80^\circ$ .



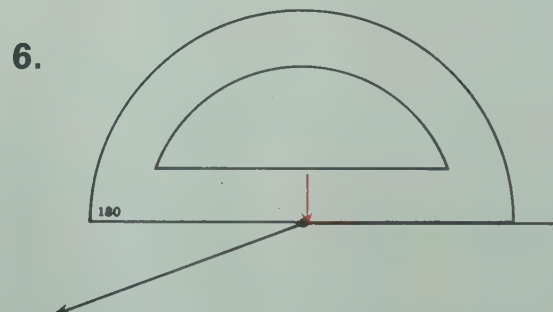
The answer  $50^\circ$  is **incorrect**.

The correct measure is  $130^\circ$ .



The answer  $100^\circ$  is **incorrect**.

The correct measure is  $102^\circ$ .

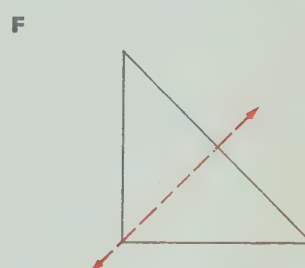
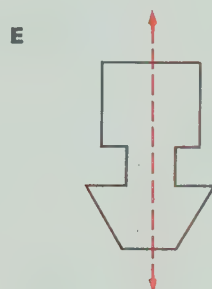
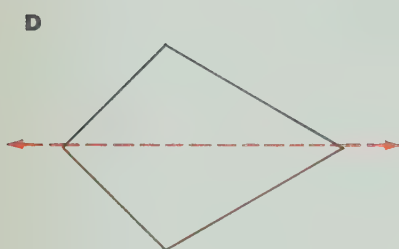
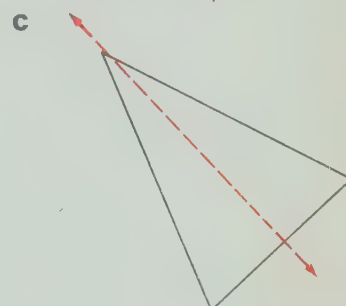
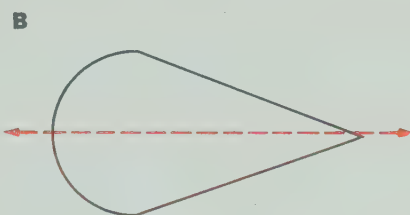
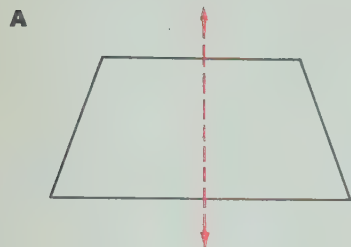
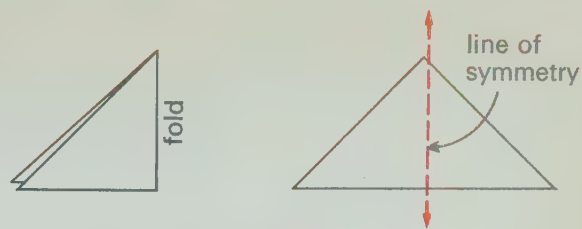


The answer "less than  $180^\circ$ " is **incorrect**.

The correct measure is  $160^\circ$ .

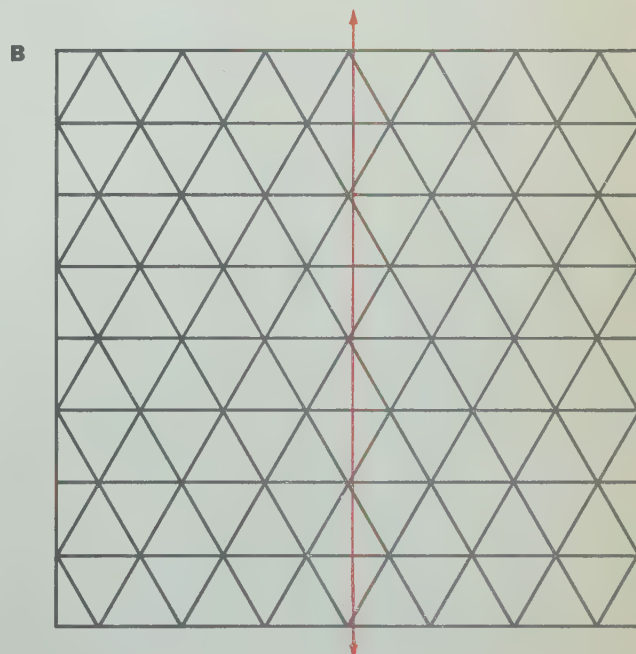
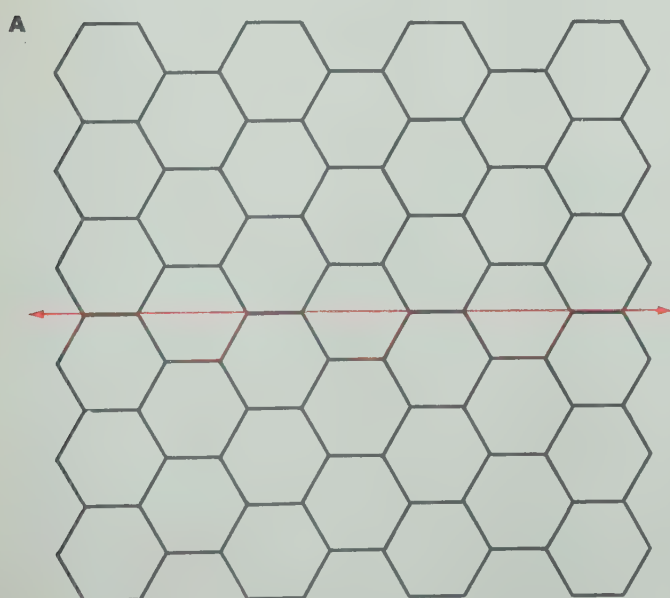


1. To find a **line of symmetry** of a figure, think about folding it in half so that the two halves match exactly. Draw the line of symmetry for each figure below.

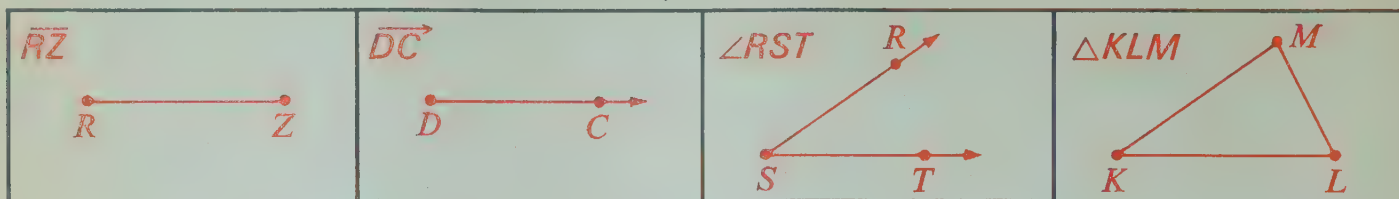


2. Use two different colors to color each tessellation so that the red line is the line of symmetry for each tessellation.

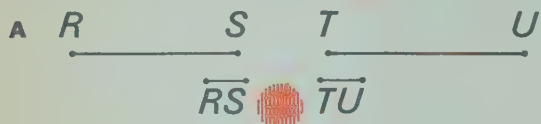
*Answers will vary.*



1. In each box, draw and label a figure for each symbol.



2. Write  $\cong$  or  $\not\cong$  in each  to tell whether the figures are congruent.

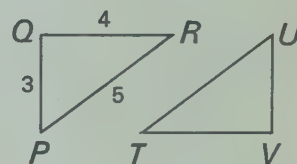


3. In exercise 2,

A the length of  $\overline{TU}$  is  $2\frac{1}{2}$  centimetres.    B the measure of  $\angle 1$  is  $120^\circ$  degrees.

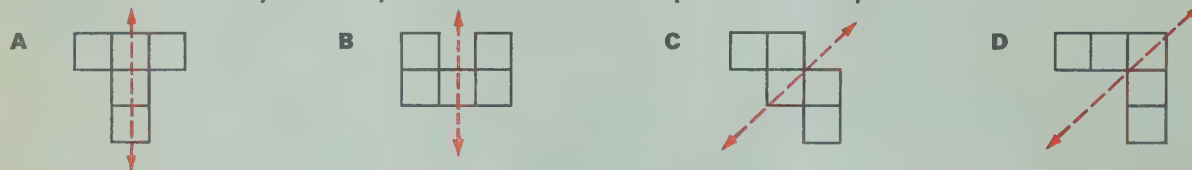
4. Triangles  $PQR$  and  $UVT$  are congruent. Complete the statements.

A  $\overline{PQ} \cong \underline{\overline{UV}}$     B  $\overline{QR} \cong \underline{\overline{VT}}$     C  $\angle TVU \cong \underline{\angle RQP}$



5. In exercise 4, the perimeter of  $\triangle PQR$  is 12 units.

6. Draw a line of symmetry for each of these pentomino pieces.



## CHANGE OF PACE

1.  $1+2=(2 \times 3) \div 2 = \underline{3}$

2.  $1+2+3=(3 \times 4) \div 2 = \underline{6}$

3.  $1+2+3+4=(4 \times 5) \div 2 = \underline{10}$

4.  $1+2+3+4+5=(5 \times 6) \div 2 = \underline{15}$

5.  $1+2+3+4+5+6=(6 \times 7) \div 2 = \underline{21}$

6.  $1+2+3+4+5+6+7=(\underline{7} \times \underline{8}) \div 2 = \underline{28}$

7.  $1+2+3+4+5+6+7+8=(\underline{8} \times \underline{9}) \div 2 = \underline{36}$

8.  $1+2+3+4+\cdots+48+49+\underline{50}=(\underline{50} \times \underline{51}) \div 2 = \underline{1275}$

9.  $1+2+3+4+\cdots+96+97+98+99+\underline{100}=(\underline{100} \times \underline{101}) \div 2 = \underline{5050}$

Complete exercises 1 through 5. Then check each sum to be sure the answer is correct. Finally, use the same idea to find the last four sums.



sample answers:

1. A In example A, write digits in each  so that the digit in the  is 3.

$$\begin{array}{r} \text{A} \quad 354 \\ + 283 \\ \hline 637 \end{array}$$

$$\begin{array}{r} \text{B} \quad 354 \\ + 289 \\ \hline 643 \end{array}$$

- B In example B, write digits in each  so that the digit in the  is 4.

Any combination of digits  
with sum of 9 or less.

Any combination  
of digits with  
sum of 10 to 19.

2. Give the missing numbers in the screens. Then find the sums.

$$\begin{array}{r} \text{A} \quad 65 \rightarrow 60 + 5 \\ + 27 \rightarrow 20 + 7 \\ \hline 92 \leftarrow 80 + 12 \end{array}$$

$$\begin{array}{r} \text{B} \quad 93 \rightarrow 90 + 3 \\ + 39 \rightarrow 30 + 9 \\ \hline 132 \leftarrow 120 + 12 \end{array}$$

$$\begin{array}{r} \text{C} \quad 453 \rightarrow 400 + 50 + 3 \\ + 874 \rightarrow 800 + 70 + 4 \\ \hline 1327 \leftarrow 1200 + 120 + 7 \end{array}$$

3. Find the sums.

$$\begin{array}{r} \text{A} \quad 68 \\ + 24 \\ \hline 92 \end{array}$$

$$\begin{array}{r} \text{B} \quad 39 \\ + 75 \\ \hline 114 \end{array}$$

$$\begin{array}{r} \text{C} \quad 83 \\ + 29 \\ \hline 112 \end{array}$$

$$\begin{array}{r} \text{D} \quad 416 \\ + 897 \\ \hline 1313 \end{array}$$

$$\begin{array}{r} \text{E} \quad 398 \\ + 425 \\ \hline 823 \end{array}$$

$$\begin{array}{r} \text{F} \quad 2075 \\ + 944 \\ \hline 3019 \end{array}$$

4. A In example A, write digits in each  so that the digit in the  is 3.

$$\begin{array}{r} \text{A} \quad 67 \\ - 34 \\ \hline 3 \end{array}$$

$$\begin{array}{r} \text{B} \quad 67 \\ - 34 \\ \hline 3 \end{array}$$

- B In example B, write digits in each  so that the digit in the  is 2.

Any combination of digits that  
does not require regrouping.

Any combination  
of digits that  
requires regrouping.

5. Give the missing numbers. Then find the differences.

$$\begin{array}{r} \text{A} \quad 53 \rightarrow 50 + 3 \rightarrow 40 + 13 \\ - 27 \rightarrow - (20 + 7) \rightarrow - (20 + 7) \\ \hline 26 \qquad \qquad \qquad 20 + 6 \end{array}$$

$$\begin{array}{r} \text{B} \quad 806 \rightarrow 800 + 0 + 6 \rightarrow 700 + 100 + 6 \\ - 394 \rightarrow - (300 + 90 + 4) \rightarrow - (300 + 90 + 4) \\ \hline 412 \qquad \qquad \qquad 400 + 10 + 2 \end{array}$$

6. Find the differences.

$$\begin{array}{r} \text{A} \quad 92 \\ - 48 \\ \hline 44 \end{array}$$

$$\begin{array}{r} \text{B} \quad 623 \\ - 419 \\ \hline 204 \end{array}$$

$$\begin{array}{r} \text{C} \quad 745 \\ - 396 \\ \hline 349 \end{array}$$

$$\begin{array}{r} \text{D} \quad 901 \\ - 725 \\ \hline 176 \end{array}$$

$$\begin{array}{r} \text{E} \quad 805 \\ - 338 \\ \hline 467 \end{array}$$

$$\begin{array}{r} \text{F} \quad 4078 \\ - 1499 \\ \hline 2579 \end{array}$$

1. Find the total amounts.

$$\begin{array}{r} \text{A } \$16.32 \\ 19.49 \\ \hline \$35.81 \end{array}$$

$$\begin{array}{r} \text{B } \$52.83 \\ 27.95 \\ \hline \$80.78 \end{array}$$

$$\begin{array}{r} \text{C } \$172.86 \\ 44.78 \\ \hline \$217.64 \end{array}$$

$$\begin{array}{r} \text{D } \$348.98 \\ 652.37 \\ \hline \$1001.35 \end{array}$$

$$\begin{array}{r} \text{E } \$500.19 \\ 278.88 \\ \hline \$779.07 \end{array}$$

$$\begin{array}{r} \text{F } \$2.89 \\ 3.47 \\ 1.66 \\ \hline \$8.02 \end{array}$$

$$\begin{array}{r} \text{G } \$21.95 \\ 17.77 \\ 9.28 \\ \hline \$49.00 \end{array}$$

$$\begin{array}{r} \text{H } \$38.25 \\ 50.00 \\ 72.75 \\ \hline \$161.00 \end{array}$$

$$\begin{array}{r} \text{I } \$238.46 \\ 275.91 \\ 309.18 \\ \hline \$823.55 \end{array}$$

$$\begin{array}{r} \text{J } \$196.39 \\ 74.18 \\ 2.99 \\ \hline \$273.56 \end{array}$$

2. Find the difference in the amounts.

$$\begin{array}{r} \text{A } \$18.77 \\ 5.84 \\ \hline \$12.93 \end{array}$$

$$\begin{array}{r} \text{B } \$32.90 \\ 17.65 \\ \hline \$15.25 \end{array}$$

$$\begin{array}{r} \text{C } \$23.50 \\ 14.46 \\ \hline \$9.04 \end{array}$$

$$\begin{array}{r} \text{D } \$53.00 \\ 49.95 \\ \hline \$3.05 \end{array}$$

$$\begin{array}{r} \text{E } \$10.00 \\ 1.89 \\ \hline \$8.11 \end{array}$$

$$\begin{array}{r} \text{F } \$50.00 \\ 37.75 \\ \hline \$12.25 \end{array}$$

$$\begin{array}{r} \text{G } \$192.50 \\ 14.84 \\ \hline \$177.66 \end{array}$$

$$\begin{array}{r} \text{H } \$207.19 \\ 93.68 \\ \hline \$113.51 \end{array}$$

$$\begin{array}{r} \text{I } \$100.00 \\ 78.29 \\ \hline \$21.71 \end{array}$$

$$\begin{array}{r} \text{J } \$19.07 \\ 1.98 \\ \hline \$17.09 \end{array}$$

3. Solve each story problem.

- A Spent \$3.45.  
Then spent \$6.23.

Spent how much in all? \$9.68

- B Earned \$9.65.  
Then earned \$4.75.

Total earnings? \$14.40

- C Had \$16.56.  
Spent \$3.75.

How much left? \$12.81

- D Bought two \$3.98 records.  
Gave clerk a \$20 bill.

How much change? \$12.04

- E \$8.67. How many pennies? 867



- F 1367 pennies. Use dollar-and-cent notation to tell how much? \$13.67

- G Had \$10.00. Spent \$2.50.  
Then spent \$4.00.

How much left? \$3.50

- H Earned 75¢ one day.  
Earned \$1.35 the next day.

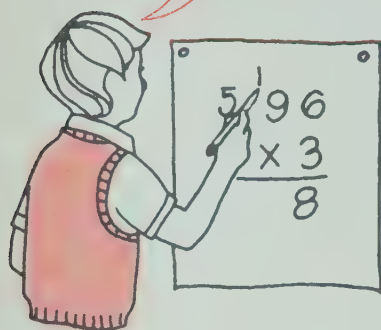
Total earnings? \$2.10



1. Fill in the blanks to show what the boy is thinking. Then study the way he writes it down.

Multiplying ones

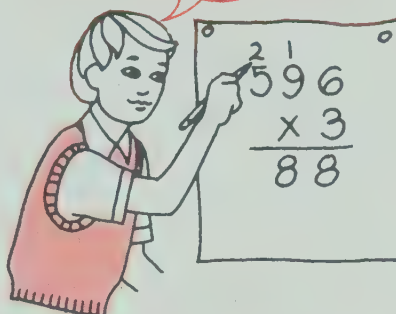
$$3 \times 6 = \underline{18}$$



Multiplying tens

$$3 \times 9 = \underline{27}$$

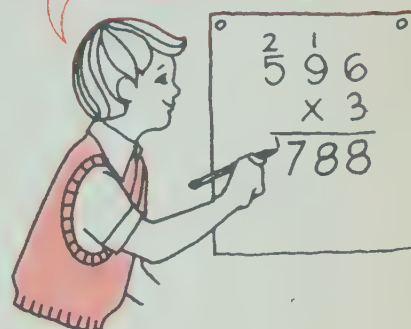
$$27 + 1 = \underline{28}$$



Multiplying hundreds

$$3 \times 5 = \underline{15}$$

$$15 + 2 = \underline{17}$$



2. Find the products.

A  $\begin{array}{r} 54 \\ \times 3 \\ \hline 162 \end{array}$

B  $\begin{array}{r} 69 \\ \times 5 \\ \hline 345 \end{array}$

C  $\begin{array}{r} 38 \\ \times 6 \\ \hline 228 \end{array}$

D  $\begin{array}{r} 27 \\ \times 4 \\ \hline 108 \end{array}$

E  $\begin{array}{r} 90 \\ \times 8 \\ \hline 720 \end{array}$

F  $\begin{array}{r} 71 \\ \times 9 \\ \hline 639 \end{array}$

G  $\begin{array}{r} 234 \\ \times 2 \\ \hline 468 \end{array}$

H  $\begin{array}{r} 558 \\ \times 4 \\ \hline 2232 \end{array}$

I  $\begin{array}{r} 678 \\ \times 5 \\ \hline 3390 \end{array}$

J  $\begin{array}{r} 109 \\ \times 3 \\ \hline 327 \end{array}$

K  $\begin{array}{r} 998 \\ \times 8 \\ \hline 7984 \end{array}$

L  $\begin{array}{r} 489 \\ \times 7 \\ \hline 3423 \end{array}$

M  $\begin{array}{r} 2003 \\ \times 9 \\ \hline 18027 \end{array}$

N  $\begin{array}{r} 5267 \\ \times 3 \\ \hline 15801 \end{array}$

O  $\begin{array}{r} 8190 \\ \times 6 \\ \hline 49140 \end{array}$

P  $\begin{array}{r} 1476 \\ \times 7 \\ \hline 10332 \end{array}$

Q  $\begin{array}{r} 6005 \\ \times 3 \\ \hline 18015 \end{array}$

R  $\begin{array}{r} 9991 \\ \times 9 \\ \hline 89919 \end{array}$

3. Fill the blanks.

A  $4 \times 26 = \underline{104} \rightarrow 10 \times 4 \times 26 = \underline{1040} \rightarrow 40 \times 26 = \underline{1040}$

B  $8 \times 54 = \underline{432} \rightarrow 10 \times 8 \times 54 = \underline{4320} \rightarrow 80 \times 54 = \underline{4320}$

4. Find the products.

A  $\begin{array}{r} 38 \\ \times 4 \\ \hline 152 \end{array} \quad \begin{array}{r} 38 \\ \times 40 \\ \hline 1520 \end{array}$

B  $\begin{array}{r} 79 \\ \times 3 \\ \hline 237 \end{array} \quad \begin{array}{r} 79 \\ \times 30 \\ \hline 2370 \end{array}$

C  $\begin{array}{r} 463 \\ \times 4 \\ \hline 1852 \end{array} \quad \begin{array}{r} 463 \\ \times 40 \\ \hline 18520 \end{array} \quad \begin{array}{r} 463 \\ \times 400 \\ \hline 185200 \end{array}$

D  $\begin{array}{r} 74 \\ \times 50 \\ \hline 3700 \end{array}$

E  $\begin{array}{r} 27 \\ \times 40 \\ \hline 1080 \end{array}$

F  $\begin{array}{r} 35 \\ \times 90 \\ \hline 3150 \end{array}$

G  $\begin{array}{r} 545 \\ \times 200 \\ \hline 109000 \end{array}$

H  $\begin{array}{r} 793 \\ \times 500 \\ \hline 396500 \end{array}$

I  $\begin{array}{r} 218 \\ \times 600 \\ \hline 130800 \end{array}$

1. Find the products. Give the missing numbers in each

A  $26 \times 54 = (26 \times 4) + (26 \times 50)$

$$\begin{array}{r} 26 \\ \times 54 \\ \hline 104 \\ 1300 \\ \hline 1404 \end{array}$$

B  $647 \times 243 = (647 \times 3) + (647 \times 40) + (647 \times 200)$

$$\begin{array}{r} 647 \\ \times 243 \\ \hline 1941 \\ 25880 \\ 129400 \\ \hline 157221 \end{array}$$

2. Find the products.

A  $386 \times 3 = 1158$

$386 \times 60 = 23,160$

$386 \times 200 = 77,200$

$386 \times 263 = 101,518$

B  $951 \times 5 = 4755$

$951 \times 400 = 380,400$

$951 \times 405 = 385,155$

3. Find the products.

A  $84 \times 23 = 1932$

B  $37 \times 91 = 3367$

C  $56 \times 45 = 2520$

D  $698 \times 32 = 22,336$

E  $571 \times 63 = 35,973$

F  $250 \times 589 = 147,250$

G  $879 \times 312 = 274,248$

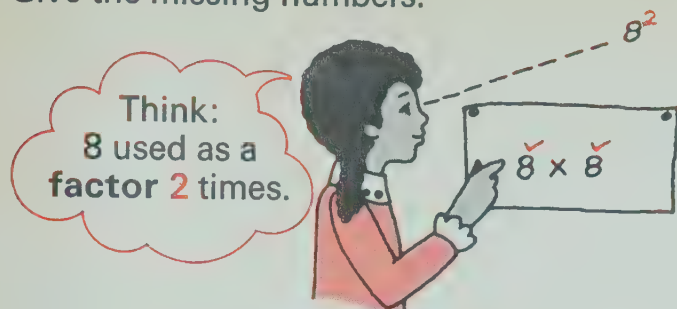
H  $206 \times 207 = 42,642$

I  $921 \times 846 = 779,166$

J  $7516 \times 347 = 2,608,052$



1. Give the missing numbers.



$$8^2 = \underline{8} \times \underline{8} = \underline{64}$$



$$7^4 = \underline{7} \times \underline{7} \times \underline{7} \times \underline{7} = \underline{2401}$$

2. Give the missing numbers.

A  $6^3$  means that 6 is used as a factor 3 times.

$$6^3 = \underline{6 \times 6 \times 6} = \underline{216}$$

B  $3^5$  means that 3 is used as a factor 5 times.

$$3^5 = \underline{3 \times 3 \times 3 \times 3 \times 3} = \underline{243}$$

C  $4^3$  means that 4 is used as a factor 3 times.

$$4^3 = \underline{4 \times 4 \times 4} = \underline{64}$$

3. Write each of the following using an exponent.

A  $3 \times 3 \times 3$   $3^3$

B  $7 \times 7$   $7^2$

C  $9 \times 9 \times 9 \times 9$   $9^4$

D  $10 \times 10 \times 10 \times 10 \times 10$   $10^5$

E  $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$   $5^7$

4. Give the missing numbers.

A  $3^2 = \underline{9}$

C  $8^3 = \underline{512}$

E  $2^6 = \underline{64}$

G  $7^4 = \underline{2401}$

B  $12^2 = \underline{144}$

D  $3^3 = \underline{27}$

F  $3^5 = \underline{243}$

H  $9^3 = \underline{729}$

5. Write T (true) or F (false) in each blank.

A  $4^2 = 8$  F

C  $2^2 \times 2 = 2^3$  T

E  $3^2 + 3^4 = 3^6$  F

B  $3^2 = 2^3$  F

D  $3^1 = 3$  T

F  $3^2 \times 3^4 = 3^6$  T

1. For each step below, give the correct digit in each    to show what the girl is thinking. Then study the way she writes the result. Finally, complete the check.

Step 1	Step 2
<div style="border: 1px solid #ccc; border-radius: 50%; padding: 10px; width: fit-content; margin-bottom: 20px;">                     Think about 57 hundreds                 </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{array}{r} 9 \text{ r } 3 \\ 6 \overline{) 57} \end{array}</math> </div> </div>	<div style="border: 1px solid #ccc; border-radius: 50%; padding: 10px; width: fit-content; margin-bottom: 20px;">                     Think about 38 tens                 </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{array}{r} 6 \text{ r } 2 \\ 6 \overline{) 38} \end{array}</math> </div> </div>
<div style="border: 1px solid #ccc; border-radius: 50%; padding: 10px; width: fit-content; margin-bottom: 20px;">                     Think about 29 ones                 </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{array}{r} 4 \text{ r } 5 \\ 6 \overline{) 29} \end{array}</math> </div> </div>	<div style="text-align: center;"> <div style="display: flex; justify-content: space-around; align-items: center;"> <div> <math display="block">\begin{array}{r} 964 \\ \times 6 \\ \hline 5784 \end{array}</math> </div> <div style="font-size: 2em;">↗</div> <div> <math display="block">\begin{array}{r} 5784 \\ + 5 \\ \hline 5789 \end{array}</math> </div> </div> </div>

2. Find the quotients and remainders.

A  $\begin{array}{r} 301 \text{ r } 2 \\ 3 \overline{) 905} \end{array}$

B  $\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$

C  $\begin{array}{r} 141 \text{ r } 3 \\ 6 \overline{) 849} \end{array}$

D  $\begin{array}{r} 77 \text{ r } 1 \\ 4 \overline{) 309} \end{array}$

E  $\begin{array}{r} 965 \\ 2 \overline{) 1930} \end{array}$

F  $\begin{array}{r} 781 \text{ r } 3 \\ 4 \overline{) 3127} \end{array}$

G  $\begin{array}{r} 800 \text{ r } 1 \\ 7 \overline{) 5601} \end{array}$

H  $\begin{array}{r} 573 \\ 5 \overline{) 2865} \end{array}$

I  $\begin{array}{r} 823 \text{ r } 1 \\ 9 \overline{) 7408} \end{array}$

J  $\begin{array}{r} 826 \\ 6 \overline{) 4956} \end{array}$

K  $\begin{array}{r} 822 \text{ r } 2 \\ 8 \overline{) 6578} \end{array}$

L  $\begin{array}{r} 991 \text{ r } 2 \\ 3 \overline{) 2975} \end{array}$



1. Find the largest whole number that will make the sentence true.

A 8  $\times 32 \leq 271$

B 7  $\times 58 \leq 444$

C 7  $\times 18 \leq 129$

D 4  $\times 71 \leq 321$

E 9  $\times 89 \leq 845$

F 7  $\times 67 \leq 489$

In exercises 2 through 5, the quotient in part A is the same or "close" to the quotient in part B. Find the quotient in part A and use it to find the quotient and remainder in part B.

2. A  $40 \overline{)342}$   
8  
320

B  $41 \overline{)342}$   
8 r 14

3. A  $30 \overline{)246}$   
8  
240

B  $28 \overline{)246}$   
8 r 22

4. A  $50 \overline{)468}$   
9  
450

B  $52 \overline{)468}$   
9 r 0

5. A  $70 \overline{)550}$   
7  
490

B  $67 \overline{)550}$   
8 r 14

6. Find the quotients and remainders.

A  $23 \overline{)135}$   
5 r 20

B  $54 \overline{)428}$   
7 r 50

C  $46 \overline{)399}$   
8 r 31

D  $30 \overline{)290}$   
9 r 20

E  $25 \overline{)194}$   
7 r 19

F  $72 \overline{)639}$   
8 r 63

G  $36 \overline{)355}$   
9 r 31

H  $53 \overline{)400}$   
7 r 29

I  $90 \overline{)528}$   
5 r 78

J  $60 \overline{)205}$   
3 r 25

K  $81 \overline{)700}$   
8 r 52

L  $55 \overline{)495}$   
9

M  $29 \overline{)203}$   
7

N  $71 \overline{)600}$   
8 r 32

O  $49 \overline{)333}$   
6 r 39

P  $38 \overline{)286}$   
7 r 20

1. Give the missing numbers.

- A When 8 is substituted for each addend at the right, the sum is the same.  
The average of 7, 9, 6, and 10 is 8.

$$\overset{8}{7} + \overset{8}{9} + \overset{8}{6} + \overset{8}{10} = 32$$

- B When 9 is substituted for each addend at the right, the sum is the same.

$$\overset{9}{10} + \overset{9}{6} + \overset{9}{11} = 27$$

The average of 10, 6, and 11 is 9.

2. Give the missing numbers.

A  $\overset{5}{3} + \overset{5}{5} + \overset{5}{7} = 15$

The average of 3, 5, and 7 is 5.

B  $\overset{7}{10} + \overset{7}{2} + \overset{7}{9} = 21$

The average of 10, 2, and 9 is 7.

C  $\overset{8}{4} + \overset{8}{8} + \overset{8}{12} = 24$

The average of 4, 8, and 12 is 8.

3. Complete the sentences.

- A To find the average of 4, 5, and 9, divide 18 by 3.  
B To find the average of 9 and 13, divide 22 by 2.  
C To find the average of 5, 7, 12, and 8, divide 32 by 4.  
D To find the average of any 4 numbers,  
divide the sum of the numbers by 4.

4. Give the missing numbers.

- A When 6 is substituted for each addend, the sum is 24.  $\overset{6}{9} + \overset{6}{5} + \overset{6}{7} + \overset{6}{4} = 25$

- B When 7 is substituted for each addend, the sum is 28.  $\overset{7}{9} + \overset{7}{5} + \overset{7}{7} + \overset{7}{4} = 25$

- C We say: The average of 9, 5, 7, and 4,  
to the nearest whole number, is 6. Notice that:  $\overset{6}{4} \overline{) 25} \text{ R1}$

5. Find the average (to the nearest whole number) of these numbers.

A 13, 12, 9, 8 10

D 500, 2685, 970 1385

B 14, 16, 20, 24 19

E 94, 89, 76, 95, 99 91

C 50, 65, 89, 110 79

F 48, 57, 39, 54, 65, 43, 38, 70, 29, 51 49



1. Find the quotients and remainders. Use the heavy black numerals to help you estimate the quotient.

A  $\overset{2r29}{83 \overline{)195}}$   
 $\begin{array}{r} 166 \\ \hline 29 \end{array}$

B  $\overset{3r49}{83 \overline{)298}}$   
 $\begin{array}{r} 249 \\ \hline 49 \end{array}$

C  $\overset{5r78}{83 \overline{)493}}$   
 $\begin{array}{r} 415 \\ \hline 78 \end{array}$

2. Use the quotients you found in exercise 1 to complete this dividing.

A **Dividing hundreds**  
 Think:  $19500 \div 83$

B **Dividing tens**  
 Think:  $2980 \div 83$

C **Dividing ones**  
 Think:  $493 \div 83$

$\overset{2}{83 \overline{)19583}}$   
 $\begin{array}{r} 166 \\ \hline 29 \end{array}$

$\overset{23}{83 \overline{)19583}}$   
 $\begin{array}{r} 166 \\ \hline 298 \\ 249 \\ \hline 49 \end{array}$

$\overset{235}{83 \overline{)19583}}$   
 $\begin{array}{r} 166 \\ \hline 298 \\ 249 \\ \hline 493 \\ 415 \\ \hline 78 \end{array}$

3. Find the quotients and remainders.

A  $\overset{70}{72 \overline{)59346}}$   $824r18$   
 $\begin{array}{r} 576 \\ \hline 174 \\ 144 \\ \hline 306 \\ 288 \\ \hline 18 \end{array}$

B  $\overset{90}{91 \overline{)72639}}$   $798r21$   
 $\begin{array}{r} 637 \\ \hline 893 \\ 819 \\ \hline 749 \\ 728 \\ \hline 21 \end{array}$

C  $\overset{30}{28 \overline{)26075}}$   $931r7$   
 $\begin{array}{r} 252 \\ \hline 87 \\ 84 \\ \hline 35 \\ 28 \\ \hline 7 \end{array}$

D  $\overset{50}{47 \overline{)28650}}$   $609r27$   
 $\begin{array}{r} 282 \\ \hline 45 \\ 00 \\ \hline 450 \\ 423 \\ \hline 27 \end{array}$

E  $\overset{928r16}{53 \overline{)49200}}$   
 $\begin{array}{r} 477 \\ \hline 150 \\ 106 \\ \hline 440 \\ 424 \\ \hline 16 \end{array}$

F  $\overset{311r50}{64 \overline{)19954}}$   
 $\begin{array}{r} 192 \\ \hline 75 \\ 64 \\ \hline 114 \\ 64 \\ \hline 50 \end{array}$

G  $\overset{113r2}{35 \overline{)3957}}$   
 $\begin{array}{r} 35 \\ \hline 45 \\ 35 \\ \hline 107 \\ 105 \\ \hline 2 \end{array}$

H  $\overset{780r5}{16 \overline{)12485}}$   
 $\begin{array}{r} 112 \\ \hline 128 \\ 128 \\ \hline 05 \\ 00 \\ \hline 5 \end{array}$

1. Complete the example.

Step 1

**Dividing hundreds**

Think:  $154 \div 38$

$$\begin{array}{r} 4 \\ 38 \overline{) 15428} \\ \underline{152} \phantom{0} \\ 2 \phantom{0} \end{array}$$

Step 2

**Dividing tens**

Think:  $22 \div 38$

$$\begin{array}{r} 40 \\ 38 \overline{) 15428} \\ \underline{152} \phantom{0} \\ 22 \phantom{0} \end{array}$$

Step 3

**Dividing ones**

Think:  $228 \div 38$

$$\begin{array}{r} 406 \\ 38 \overline{) 15428} \\ \underline{152} \phantom{0} \\ 228 \\ \underline{228} \\ 0 \end{array}$$

2. Find the quotients and remainders.

A  $62 \overline{) 49855}$   $804r7$

$$\begin{array}{r} 804r7 \\ 62 \overline{) 49855} \\ \underline{496} \phantom{0} \\ 255 \\ \underline{248} \phantom{0} \\ 7 \phantom{0} \end{array}$$

B  $23 \overline{) 16263}$   $707r2$

$$\begin{array}{r} 707r2 \\ 23 \overline{) 16263} \\ \underline{161} \phantom{0} \\ 163 \\ \underline{161} \phantom{0} \\ 2 \phantom{0} \end{array}$$

C  $49 \overline{) 36260}$   $740$

$$\begin{array}{r} 740 \\ 49 \overline{) 36260} \\ \underline{343} \phantom{0} \\ 196 \\ \underline{196} \phantom{0} \\ 0 \phantom{0} \end{array}$$

D  $71 \overline{) 64105}$   $902r63$

$$\begin{array}{r} 902r63 \\ 71 \overline{) 64105} \\ \underline{639} \phantom{0} \\ 205 \\ \underline{142} \phantom{0} \\ 63 \phantom{0} \end{array}$$

E  $34 \overline{) 18360}$   $540$

$$\begin{array}{r} 540 \\ 34 \overline{) 18360} \\ \underline{170} \phantom{0} \\ 136 \\ \underline{136} \phantom{0} \\ 0 \phantom{0} \end{array}$$

F  $85 \overline{) 44510}$   $523r55$

$$\begin{array}{r} 523r55 \\ 85 \overline{) 44510} \\ \underline{425} \phantom{0} \\ 201 \\ \underline{170} \phantom{0} \\ 310 \\ \underline{255} \phantom{0} \\ 55 \phantom{0} \end{array}$$

G  $67 \overline{) 42210}$   $630$

$$\begin{array}{r} 630 \\ 67 \overline{) 42210} \\ \underline{402} \phantom{0} \\ 201 \\ \underline{201} \phantom{0} \\ 0 \phantom{0} \end{array}$$

H  $92 \overline{) 55936}$   $608$

$$\begin{array}{r} 608 \\ 92 \overline{) 55936} \\ \underline{552} \phantom{0} \\ 736 \\ \underline{736} \phantom{0} \\ 0 \phantom{0} \end{array}$$

I  $24 \overline{) 2650}$   $110r10$

$$\begin{array}{r} 110r10 \\ 24 \overline{) 2650} \\ \underline{24} \phantom{0} \\ 25 \\ \underline{24} \phantom{0} \\ 10 \phantom{0} \end{array}$$

J  $79 \overline{) 8095}$   $102r37$

$$\begin{array}{r} 102r37 \\ 79 \overline{) 8095} \\ \underline{79} \phantom{0} \\ 195 \\ \underline{158} \phantom{0} \\ 37 \phantom{0} \end{array}$$

K  $315 \overline{) 3142}$   $9r307$

$$\begin{array}{r} 9r307 \\ 315 \overline{) 3142} \\ \underline{2835} \phantom{0} \\ 307 \phantom{0} \end{array}$$

L  $408 \overline{) 4027}$   $9r355$

$$\begin{array}{r} 9r355 \\ 408 \overline{) 4027} \\ \underline{3672} \phantom{0} \\ 355 \phantom{0} \end{array}$$



1. Solve each story problem.

- A Average speed: 56 km/h.  
Travelled 4 hours.

Travelled how far? 224 km

- B An airplane travelled 2335 km in 5 hours. What

was its average speed? 467 km/h

- C Test scores: 87, 94, 76, 98, 96, and 83. What is the average score (to the nearest

whole number)? 89

- D One block: 528 metres.  
Five blocks.

How many m? 2640 m

- E Can pack 24 cans in a box.  
How many boxes are needed

to pack 864 cans? 36 boxes

- F Mr. Franey travelled 448 km and used 56 litres of gasoline.

How many km/l? 8 km

- G One pail of water: 62 glasses.  
How many glasses of water in

26 pails? 1612

- H Car A averages 46 km/h for 8 hours.  
Car B averages 63 km/h for 6 hours.

Which car goes farther? B

How much farther? 10 km

2. Find the products and quotients.

A  $\begin{array}{r} \$2.75 \\ \times 6 \\ \hline \$16.50 \end{array}$

B  $\begin{array}{r} \$0.96 \\ \times 8 \\ \hline \$7.68 \end{array}$

C  $\begin{array}{r} \$3.79 \\ \times 5 \\ \hline \$18.95 \end{array}$

D  $\begin{array}{r} \$16.25 \\ \times 12 \\ \hline \$195.00 \end{array}$

E  $\begin{array}{r} \$350.00 \\ \times 28 \\ \hline \$9800.00 \end{array}$

F  $\begin{array}{r} \$1.37 \\ 6 \overline{) \$8.22} \end{array}$

G  $\begin{array}{r} \$0.94 \\ 8 \overline{) \$7.52} \end{array}$

H  $\begin{array}{r} 36 \\ \$ .35 \overline{) \$12.60} \end{array}$

I  $\begin{array}{r} 88 \\ \$0.75 \overline{) \$66.00} \end{array}$

3. Solve each money problem.

- A Total cost: \$33.12. Paid \$4.  
Then pay the rest in 8 equal payments. How much is

each payment? \$3.64

- C Adult tickets: \$1.25 each.  
Student tickets: \$0.75 each.  
How much money would you collect if you sold 38 adult tickets and 26 student tickets?

- B \$20.75. How many quarters? 83

\$67.00

1. Find the sums and differences.

$$\begin{array}{r} \text{A} \quad 65 \\ + 39 \\ \hline 104 \end{array}$$

$$\begin{array}{r} \text{B} \quad 306 \\ + 194 \\ \hline 500 \end{array}$$

$$\begin{array}{r} \text{C} \quad 598 \\ + 236 \\ \hline 834 \end{array}$$

$$\begin{array}{r} \text{D} \quad 92 \\ - 18 \\ \hline 74 \end{array}$$

$$\begin{array}{r} \text{E} \quad 835 \\ - 549 \\ \hline 286 \end{array}$$

$$\begin{array}{r} \text{F} \quad 714 \\ - 346 \\ \hline 368 \end{array}$$

2. Find the products and quotients.

$$\begin{array}{r} \text{A} \quad 253 \\ \times 84 \\ \hline 21 \quad 252 \end{array}$$

$$\begin{array}{r} \text{B} \quad 709 \\ \times 315 \\ \hline 223 \quad 335 \end{array}$$

$$\text{C} \quad 6 \overline{)4753} \quad 792 \text{ r } 1$$

$$\text{D} \quad 34 \overline{)3092} \quad 90 \text{ r } 32$$

$$\text{E} \quad 516 \overline{)20640} \quad 40$$

3. Find the average (to the nearest whole number) of 86, 75, 64, and 93. 80

4. Mr. Jones kept this record of his trip.

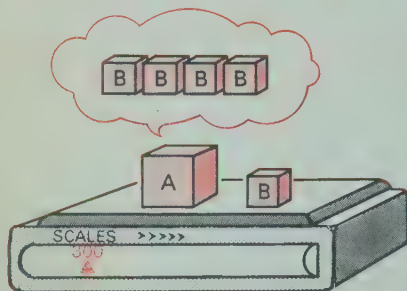
A What was his average speed? 40 km/h

B How many kilometres did he travel per litre of gasoline? 5 km

C What was the total cost of the gasoline? \$12.96

km	Hours (driving time)	litres of gasoline	Cost of gasoline
360	9	72	18c /litre

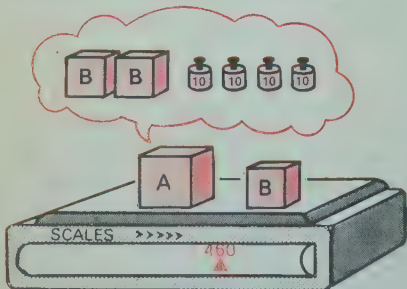
## CHANGE OF PACE



1. Block A weighs 4 times as much as block B. Together they weigh 300 grams.

A Block A weighs 240 g.

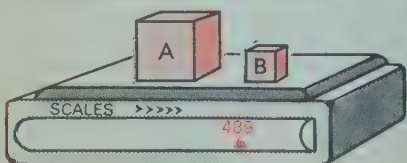
B Block B weighs 60 g.



2. Block A weighs 40 grams more than twice block B. Together blocks A and B weigh 460 grams.

A Block A weighs 320 g.

B Block B weighs 140 g.



3. Block A weighs 1 gram less than 6 times as much as block B. Together the blocks weigh 489 grams.

A Block A weighs 419 g.

B Block B weighs 70 g.



1. Whenever possible, give a whole number in each (F stands for **factor**. P stands for **product**.)

**A**

F		F		P
48	×	1	=	48
24	×	2	=	48
16	×	3	=	48
12	×	4	=	48
	×	5	=	48
8	×	6	=	48

The factors of 48 are

1, 2, 3, 4, 6, 8, 12, 16, 24, 48.

**B**

F		F		P
42	×	1	=	42
21	×	2	=	42
14	×	3	=	42
	×	4	=	42
	×	5	=	42
7	×	6	=	42

The factors of 42 are

1, 2, 3, 6, 7, 14, 21, 42.

**C**

F		F		P
47	×	1	=	47
	×	2	=	47
	×	3	=	47
	×	4	=	47
	×	5	=	47
	×	6	=	47

The factors of 47 are

1, 47

2. Give the missing factors and products.

**A**

$$\begin{array}{c} 5 \times 2 \times 3 \\ | \quad \quad | \\ 5 \times 6 \\ | \quad \quad | \\ 30 \end{array}$$

**B**

$$\begin{array}{c} 3 \times 3 \times 2 \\ | \quad \quad | \\ 9 \times 2 \\ | \quad \quad | \\ 18 \end{array}$$

**C**

$$\begin{array}{c} 11 \times 3 \times 2 \\ | \quad \quad | \\ 11 \times 6 \\ | \quad \quad | \\ 66 \end{array}$$

**D**

$$\begin{array}{c} 3 \times 5 \times 7 \\ | \quad \quad | \\ 3 \times 35 \\ | \quad \quad | \\ 105 \end{array}$$

**E**

$$\begin{array}{c} 2 \times 7 \times 3 \times 5 \\ | \quad \quad | \quad \quad | \\ 14 \times 15 \\ | \quad \quad | \\ 210 \end{array}$$

**F**

$$\begin{array}{c} 2 \times 2 \times 2 \times 17 \\ | \quad \quad | \quad \quad | \\ 4 \times 34 \\ | \quad \quad | \\ 136 \end{array}$$

**G**

$$\begin{array}{c} 5 \times 3 \times 3 \times 3 \\ | \quad \quad | \quad \quad | \\ 15 \times 9 \\ | \quad \quad | \\ 135 \end{array}$$

3. List all the factors of each number.

**A** 18 1, 2, 3, 6, 9, 18

**B** 50 1, 2, 5, 10, 25, 50

**C** 81 1, 3, 9, 27, 81

**D** 71 1, 71

**E** 96 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

**F** 99 1, 3, 9, 11, 33, 99

1. A In the list of numbers at the right, mark out all the multiples of 2 that are greater than 2. (see “/”)
- B Mark out all multiples of 3 that are greater than 3. (see “\”)
- C Mark out all multiples of 5 that are greater than 5. (see “—”)
- D Mark out all multiples of 7 that are greater than 7. (see “○”)
- E Each number **not marked out** has **exactly 2 factors** (1 and the number itself) and is a **prime number** less than 100. List below the prime numbers less than 100.

<del>1</del>	2	3	<del>4</del>	5	<del>6</del>	7	<del>8</del>	9	<del>10</del>
11	<del>12</del>	13	<del>14</del>	<del>15</del>	<del>16</del>	17	<del>18</del>	19	<del>20</del>
<del>21</del>	22	23	<del>24</del>	<del>25</del>	<del>26</del>	<del>27</del>	<del>28</del>	29	<del>30</del>
31	<del>32</del>	<del>33</del>	<del>34</del>	<del>35</del>	<del>36</del>	37	<del>38</del>	<del>39</del>	<del>40</del>
41	<del>42</del>	43	<del>44</del>	<del>45</del>	<del>46</del>	47	<del>48</del>	<del>49</del>	<del>50</del>
<del>51</del>	52	53	<del>54</del>	<del>55</del>	<del>56</del>	<del>57</del>	58	59	<del>60</del>
61	62	<del>63</del>	64	<del>65</del>	<del>66</del>	67	<del>68</del>	<del>69</del>	<del>70</del>
71	<del>72</del>	73	<del>74</del>	<del>75</del>	<del>76</del>	<del>77</del>	<del>78</del>	79	<del>80</del>
<del>81</del>	82	83	<del>84</del>	<del>85</del>	<del>86</del>	<del>87</del>	<del>88</del>	89	<del>90</del>
<del>91</del>	92	93	<del>94</del>	<del>95</del>	<del>96</del>	97	<del>98</del>	<del>99</del>	<del>100</del>

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53,

59, 61, 67, 71, 73, 79, 83, 89, 97

2. Numbers greater than 1 that are not prime can be written as the product of prime numbers.

For example, 24 can be written as the product  $3 \times 2 \times 2 \times 2$ .

The **prime factorization** of 24 is  $3 \times 2 \times 2 \times 2$ .

Give the missing prime number in each blank so that the prime factorization of each number is given.

A  $4 = \underline{2} \times \underline{2}$

E  $18 = 2 \times \underline{3} \times \underline{3}$

B  $6 = \underline{2} \times \underline{3}$

F  $20 = \underline{2} \times \underline{2} \times \underline{5}$

C  $8 = 2 \times \underline{2} \times \underline{2}$

G  $22 = \underline{2} \times \underline{11}$

D  $12 = 2 \times \underline{2} \times \underline{3}$

H  $32 = \underline{2} \times \underline{2} \times \underline{2} \times 2 \times \underline{2}$

3. Give the missing numbers in each .

A  $16 = 2 \times 8$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $\quad \quad 2 \times 2 \times 4$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $16 = 2 \times 2 \times 2 \times 2$

B  $340 = 17 \times 20$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $\quad \quad 17 \times 5 \times 4$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $340 = 17 \times 5 \times 2 \times 2$

C  $56 = 7 \times 8$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $\quad \quad 7 \times 2 \times 4$   
 $\quad \quad \quad \swarrow \quad \searrow$   
 $56 = 7 \times 2 \times 2 \times 2$



1. A List the factors of 24.  $\rightarrow \{1, 2, 3, 4, 6, 8, 12, 24\}$   
 B List the factors of 40.  $\rightarrow \{1, 2, 4, 5, 8, 10, 20, 40\}$   
 C List the common factors of 24 and 40.  $\rightarrow \{1, 2, 4, 8\}$   
 D The greatest common factor of 24 and 40 is 8.

2. A List the factors of 42.  $\rightarrow \{1, 2, 3, 6, 7, 14, 21, 42\}$   
 B List the factors of 56.  $\rightarrow \{1, 2, 4, 7, 8, 14, 28, 56\}$   
 C List the common factors of 42 and 56.  $\rightarrow \{1, 2, 7, 14\}$   
 D The greatest common factor of 42 and 56 is 14.

3. You can use the prime factorizations of two numbers to find the greatest common factor of the two numbers. Study the example. Then give the GCF (greatest common factor) of each pair of numbers whose prime factorizations are given below.

$18 = 2 \times 3 \times 3 \leftarrow$  Prime factorization of 18  
 $24 = 2 \times 2 \times 2 \times 3 \leftarrow$  Prime factorization of 24  
 The greatest factor these products have in common is  $2 \times 3$  or 6.

The GCF of 18 and 24 is 6.

A  $12 = 2 \times 2 \times 3$   
 $20 = 2 \times 2 \times 5$   
 GCF of 12 and 20 is 4.

B  $90 = 3 \times 3 \times 2 \times 5$   
 $24 = 2 \times 2 \times 2 \times 3$   
 GCF of 90 and 24 is 6.

4. Give the prime factorizations of each number. Then find the GCF of the two numbers.

A  $70 = 2 \times 5 \times 7$   
 $28 = 2 \times 2 \times 7$   
 GCF of 70 and 28 is 14.

B  $36 = 2 \times 2 \times 3 \times 3$   
 $60 = 2 \times 3 \times 2 \times 5$   
 GCF of 36 and 60 is 12.

C  $105 = 3 \times 5 \times 7$   
 $42 = 7 \times 2 \times 3$   
 GCF of 105 and 42 is 21.

D  $210 = 3 \times 2 \times 5 \times 7$   
 $126 = 7 \times 3 \times 2 \times 3$   
 GCF of 210 and 126 is 42.

5. A What is the GCF of 48 and 32? 16 B What is the GCF of 36 and 54? 18

1. **A** List the multiples (to 70) of 10.  $\rightarrow \{10, 20, 30, 40, 50, 60, 70\}$
  - B** List the multiples (to 72) of 12.  $\rightarrow \{12, 24, 36, 48, 60, 72\}$
  - C** List the **common multiples** of 10 and 12.  $\rightarrow \{60\}$
  - D** The **LCM** (least common multiple) of 10 and 12 is 60.
2. **A** List the multiples (to 64) of 8.  $\rightarrow \{8, 16, 24, 32, 40, 48, 56, 64\}$
  - B** List the multiples (to 70) of 14.  $\rightarrow \{14, 28, 42, 56, 70\}$
  - C** List the common multiples of 8 and 14.  $\rightarrow \{56\}$
  - D** The LCM of 8 and 14 is 56.

3. In the example below, multiples of 8 (other than 0) were listed until one was found that was also a multiple of 6.

Example: Finding the least common multiple (LCM) of 8 and 6

Multiples of 8	{ 8,	16,	24, . . . }
Is this multiple of 8	↑	↑	↑
also a multiple of 6?	No	No	Yes
The LCM of 8 and 6 is <u>24</u> .			

In each exercise below, list only the multiples necessary to find the LCM of the two numbers.

- A** Multiples of 10  $\rightarrow \{10, 20, 30, \dots\}$  The LCM of 10 and 6 is 30.  
What is the first multiple of 10 that is also a multiple of 6?
- B** Multiples of 16  $\rightarrow \{16, 32, 48, \dots\}$  The LCM of 16 and 6 is 48.  
What is the first multiple of 16 that is also a multiple of 6?
- C** Multiples of 18  $\rightarrow \{18, 36, 54, 72, 90, \dots\}$  The LCM of 18 and 10 is 90.  
What is the first multiple of 18 that is also a multiple of 10?

4. Complete the prime factorization of each number. Then give the LCM of the two numbers.

**A**  $27 = 3 \times 3 \times 3$   
 $18 = 3 \times 3 \times 2$   
 LCM =  $3 \times 3 \times 3 \times 2 = 54$

**B**  $12 = 2 \times 2 \times 3$   
 $15 = 3 \times 5$   
 LCM =  $2 \times 2 \times 3 \times 5 = 60$



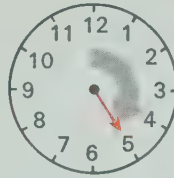
Complete each exercise by giving the missing numbers and drawing the hand on the clock in the proper position when it is missing.

1. Start at 12



Move forward.

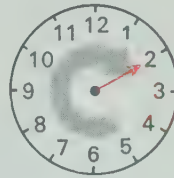
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+

Move forward

9



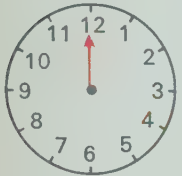
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Where is the hand now?



2

2. Start at 12



Move forward

8



-

Move backward

11



=

Where is the hand now?



9

3. Start at 12



Move forward

7



x

Move forward

7



=

Move forward

7



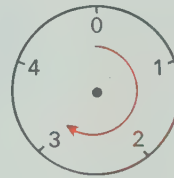
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4. Start at 0



Move forward

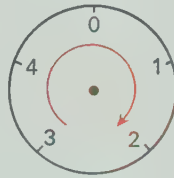
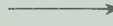
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+

Move forward

4



=

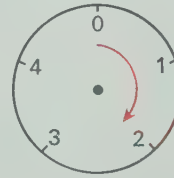
2

5. Start at 0



Move forward

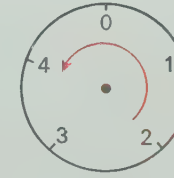
2



-

Move backward

3



=

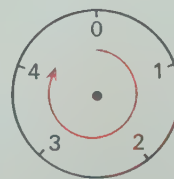
4

6. Start at 0



Move forward

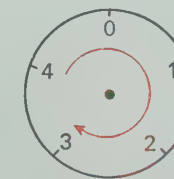
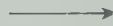
4



x

Move forward

4



=

Move forward

4



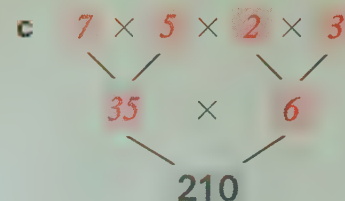
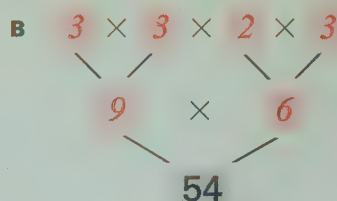
2

1. Complete the exercises.

F	F	P
18	$\times 1 =$	18
9	$\times 2 =$	18
6	$\times 3 =$	18

The factors of 18 are

1, 2, 3, 6, 9, 18.




2. List the prime numbers between 1 and 20.


2, 3, 5, 7, 11, 13, 17, 19


3. The greatest common factor of 54 and 90 is 18.

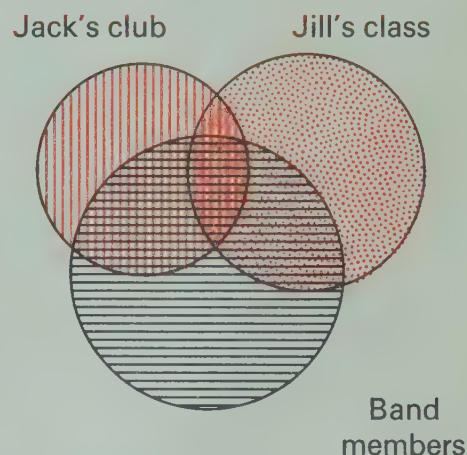
4. The least common multiple of 8 and 10 is 40.

## CHANGE OF PACE

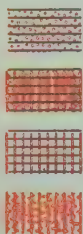
The region shaded like this →  represents the pupils in Jack's club.

The region shaded like this →  represents the pupils in Jill's class.

The region shaded like this →  represents the band members.



1. Draw a line to match each region with the group of pupils it represents.



Pupils in Jill's class and in Jack's club, but not in the band.

Pupils in Jack's club and in the band, but not in Jill's class.

Pupils in Jill's class and in the band, but not in Jack's club.

Pupils in Jill's class, in Jack's club, and in the band.

2. Jill's class has 24 pupils. Jack's club has 15 members. When Jill's class and Jack's club meet together, there are 35 people. How can you explain this?


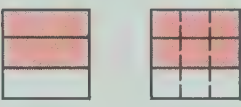

Four children are in both Jill's class and

Jack's club.



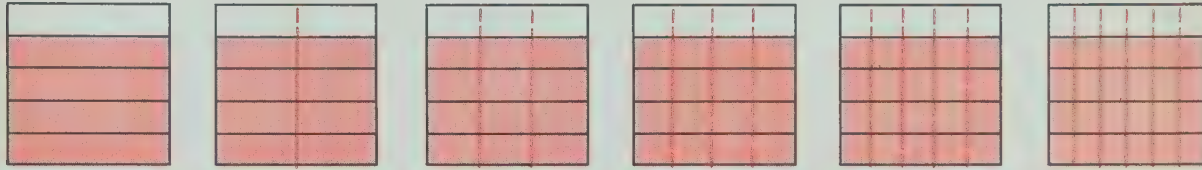
1. A pair of fractions that suggest the same number of objects in a set or the same part of an object are called **equivalent fractions**.

Give a pair of equivalent fractions suggested by each picture.

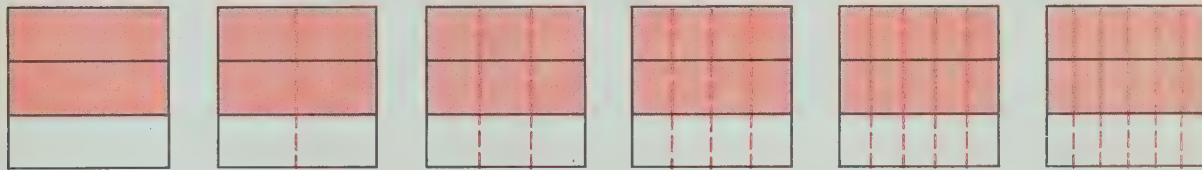
**A**  **B**  **C** 

$\frac{1}{2}$  is equivalent to  $\frac{2}{4}$        $\frac{2}{3}$  is equivalent to  $\frac{6}{9}$        $\frac{10}{12}$  is equivalent to  $\frac{5}{6}$

2. In each row the fractions suggested by the figures are equivalent to each other. Give these fractions

**A** 

$\frac{4}{5}$        $\frac{8}{10}$        $\frac{12}{15}$        $\frac{16}{20}$        $\frac{20}{25}$        $\frac{24}{30}$

**B** 

$\frac{1 \times 2}{1 \times 3}$        $\frac{2 \times 2}{2 \times 3}$        $\frac{3 \times 2}{3 \times 3}$        $\frac{4 \times 2}{4 \times 3}$        $\frac{5 \times 2}{5 \times 3}$        $\frac{6 \times 2}{6 \times 3}$

↓      ↓      ↓      ↓      ↓      ↓

$\frac{2}{3}$        $\frac{4}{6}$        $\frac{6}{9}$        $\frac{8}{12}$        $\frac{10}{15}$        $\frac{12}{18}$

3. For each exercise, give 6 fractions that are equivalent to the fraction given.

**A**  $\left\{ \frac{1}{7}, \frac{2}{14}, \frac{3}{21}, \frac{4}{28}, \frac{5}{35}, \frac{6}{42}, \frac{7}{49} \right\}$       **C**  $\left\{ \frac{5}{9}, \frac{10}{18}, \frac{15}{27}, \frac{20}{36}, \frac{25}{45}, \frac{30}{54}, \frac{35}{63} \right\}$

**B**  $\left\{ \frac{7}{10}, \frac{14}{20}, \frac{21}{30}, \frac{28}{40}, \frac{35}{50}, \frac{42}{60}, \frac{49}{70} \right\}$       **D**  $\left\{ \frac{3}{8}, \frac{6}{16}, \frac{9}{24}, \frac{12}{32}, \frac{15}{40}, \frac{18}{48}, \frac{21}{56} \right\}$

1. When the numerator and denominator of a fraction have no common factor other than 1, the fraction is a **lowest-terms** fraction.

In each part, give the factors of the numerator. Then give the factors of the denominator. Then circle the fraction if it is in lowest terms.

A  $\frac{15}{26}$  {  $\frac{1, 3, 5, 15}{1, 2, 13, 26}$  }

D  $\frac{30}{75}$  {  $\frac{1, 2, 3, 5, 6, 10, 15, 30}{1, 3, 5, 15, 25, 75}$  }

B  $\frac{16}{21}$  {  $\frac{1, 2, 4, 8, 16}{1, 3, 7, 21}$  }

E  $\frac{15}{60}$  {  $\frac{1, 3, 5, 15}{1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60}$  }

C  $\frac{18}{24}$  {  $\frac{1, 2, 3, 6, 9, 18}{1, 2, 3, 4, 6, 8, 12, 24}$  }

F  $\frac{9}{28}$  {  $\frac{1, 3, 9}{1, 2, 4, 7, 14, 28}$  }

2. To find the lowest-terms fraction, you can “divide out” common factors. Give the missing numbers in the fractions below.

A  $\frac{15}{18} \rightarrow \frac{15 \div 3}{18 \div 3} \rightarrow \frac{5}{6}$

C  $\frac{30}{75} \rightarrow \frac{30 \div 5}{75 \div 5} \rightarrow \frac{6}{15} \rightarrow \frac{6 \div 3}{15 \div 3} \rightarrow \frac{2}{5}$

B  $\frac{21}{49} \rightarrow \frac{21 \div 7}{49 \div 7} \rightarrow \frac{3}{7}$

D  $\frac{24}{36} \rightarrow \frac{24 \div 3}{36 \div 3} \rightarrow \frac{8}{12} \rightarrow \frac{8 \div 4}{12 \div 4} \rightarrow \frac{2}{3}$

3. Give the lowest-terms fraction for each fraction.

A  $\frac{6}{8} \rightarrow \frac{3}{4}$

D  $\frac{8}{18} \rightarrow \frac{4}{9}$

G  $\frac{6}{9} \rightarrow \frac{2}{3}$

J  $\frac{4}{16} \rightarrow \frac{1}{4}$

M  $\frac{9}{30} \rightarrow \frac{3}{10}$

B  $\frac{5}{10} \rightarrow \frac{1}{2}$

E  $\frac{15}{25} \rightarrow \frac{3}{5}$

H  $\frac{14}{49} \rightarrow \frac{2}{7}$

K  $\frac{10}{100} \rightarrow \frac{1}{10}$

N  $\frac{7}{35} \rightarrow \frac{1}{5}$

C  $\frac{3}{15} \rightarrow \frac{1}{5}$

F  $\frac{25}{75} \rightarrow \frac{1}{3}$

I  $\frac{12}{72} \rightarrow \frac{1}{6}$

L  $\frac{12}{28} \rightarrow \frac{3}{7}$

O  $\frac{24}{64} \rightarrow \frac{3}{8}$



For each set of equivalent fractions



we think of one fractional number



and one point on the number line.

$$\left\{ \frac{3}{8}, \frac{6}{16}, \frac{9}{24}, \frac{12}{32}, \dots \right\}$$

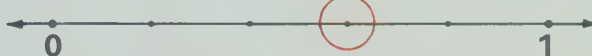


1. For each set of equivalent fractions there is one fractional number. Put a ring around the number-line point for that fractional number.

A  $\left\{ \frac{1}{6}, \frac{2}{12}, \frac{3}{18}, \frac{4}{24}, \dots \right\}$



B  $\left\{ \frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20}, \dots \right\}$



C  $\left\{ \frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}, \dots \right\}$



D  $\left\{ \frac{1}{4}, \frac{2}{8}, \frac{3}{12}, \frac{4}{16}, \dots \right\}$



E  $\left\{ \frac{7}{8}, \frac{14}{16}, \frac{21}{24}, \frac{28}{32}, \dots \right\}$



F  $\left\{ \frac{3}{10}, \frac{6}{20}, \frac{9}{30}, \frac{12}{40}, \dots \right\}$



G  $\left\{ \frac{5}{6}, \frac{10}{12}, \frac{15}{18}, \frac{20}{24}, \dots \right\}$



2. In each exercise there is just one fractional number for the point over the colored arrow. Give four fractions from the set of equivalent fractions for this number. The first fraction in the set should be a lowest-terms fraction.

A  $\left\{ \frac{3}{4}, \frac{6}{8}, \frac{9}{12}, \frac{12}{16}, \dots \right\}$



B  $\left\{ \frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}, \dots \right\}$



C  $\left\{ \frac{5}{8}, \frac{10}{16}, \frac{15}{24}, \frac{20}{32}, \dots \right\}$



D  $\left\{ \frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \frac{8}{20}, \dots \right\}$



E  $\left\{ \frac{1}{4}, \frac{2}{8}, \frac{3}{12}, \frac{4}{16}, \dots \right\}$



$$\left. \begin{array}{l} \begin{array}{c} 2 \quad 6 \\ \diagdown \quad \diagup \\ 5 \quad 15 \end{array} \rightarrow 5 \times 6 = 30 \\ \begin{array}{c} 5 \quad 15 \\ \diagup \quad \diagdown \\ 2 \quad 6 \end{array} \rightarrow 2 \times 15 = 30 \end{array} \right\}$$

These "cross products" are the same.


$\frac{2}{5}$  is equivalent to  $\frac{6}{15}$ .  
We write  $\frac{2}{5} = \frac{6}{15}$ .


$$\left. \begin{array}{l} \begin{array}{c} 2 \quad 8 \\ \diagdown \quad \diagup \\ 3 \quad 10 \end{array} \rightarrow 3 \times 8 = 24 \\ \begin{array}{c} 3 \quad 10 \\ \diagup \quad \diagdown \\ 2 \quad 8 \end{array} \rightarrow 2 \times 10 = 20 \end{array} \right\}$$


These "cross products" are **not** the same.


$\frac{2}{3}$  is not equivalent to  $\frac{8}{10}$ .  
We write  $\frac{2}{3} \neq \frac{8}{10}$ .

1. Find the products. Then give the correct sign (= or  $\neq$ ) in each .

A  $\left. \begin{array}{l} \begin{array}{c} 5 \quad 5 \\ \diagdown \quad \diagup \\ 8 \quad 6 \end{array} \rightarrow 8 \times 5 = \underline{40} \\ \begin{array}{c} 8 \quad 6 \\ \diagup \quad \diagdown \\ 5 \quad 5 \end{array} \rightarrow 5 \times 6 = \underline{30} \end{array} \right\} \frac{5}{8} \text{  } \frac{5}{6}$

C  $\left. \begin{array}{l} \begin{array}{c} 5 \quad 20 \\ \diagdown \quad \diagup \\ 6 \quad 24 \end{array} \rightarrow 6 \times 20 = \underline{120} \\ \begin{array}{c} 6 \quad 24 \\ \diagup \quad \diagdown \\ 5 \quad 20 \end{array} \rightarrow 5 \times 24 = \underline{120} \end{array} \right\} \frac{5}{6} \text{  } \frac{20}{24}$

B  $\left. \begin{array}{l} \begin{array}{c} 3 \quad 4 \\ \diagdown \quad \diagup \\ 4 \quad 3 \end{array} \rightarrow 4 \times 4 = \underline{16} \\ \begin{array}{c} 4 \quad 3 \\ \diagup \quad \diagdown \\ 3 \quad 4 \end{array} \rightarrow 3 \times 3 = \underline{9} \end{array} \right\} \frac{3}{4} \text{  } \frac{4}{3}$


D  $\left. \begin{array}{l} \begin{array}{c} 4 \quad 10 \\ \diagdown \quad \diagup \\ 6 \quad 15 \end{array} \rightarrow 6 \times 10 = \underline{60} \\ \begin{array}{c} 6 \quad 15 \\ \diagup \quad \diagdown \\ 4 \quad 10 \end{array} \rightarrow 4 \times 15 = \underline{60} \end{array} \right\} \frac{4}{6} \text{  } \frac{10}{15}$


2. Give the correct sign (= or  $\neq$ ) in each .

A  $\frac{3}{6} \text{  } \frac{4}{8}$

D  $\frac{9}{15} \text{  } \frac{3}{5}$

G  $\frac{5}{6} \text{  } \frac{7}{8}$

J  $\frac{4}{3} \text{  } \frac{20}{15}$

B  $\frac{1}{3} \text{  } \frac{3}{12}$

E  $\frac{3}{7} \text{  } \frac{13}{17}$

H  $\frac{12}{15} \text{  } \frac{20}{25}$

K  $\frac{5}{9} \text{  } \frac{10}{36}$

C  $\frac{8}{12} \text{  } \frac{3}{4}$

F  $\frac{8}{14} \text{  } \frac{16}{21}$

I  $\frac{10}{7} \text{  } \frac{20}{21}$

L  $\frac{36}{40} \text{  } \frac{9}{10}$

3. Give the missing numerator or denominator for each pair of equivalent fractions.

A  $\frac{7}{8} = \frac{35}{40}$

D  $\frac{4}{5} = \frac{24}{30}$

G  $\frac{5}{10} = \frac{25}{50}$

J  $\frac{10}{18} = \frac{15}{27}$

B  $\frac{1}{2} = \frac{12}{24}$

E  $\frac{1}{6} = \frac{9}{54}$

H  $\frac{7}{1} = \frac{21}{3}$

K  $\frac{25}{30} = \frac{40}{48}$

C  $\frac{3}{20} = \frac{15}{100}$

F  $\frac{10}{30} = \frac{20}{60}$

I  $\frac{5}{3} = \frac{25}{15}$

L  $\frac{24}{36} = \frac{6}{9}$

1. Give the correct numerator or denominator in each .  
Then write the correct sign ( $<$  or  $>$ ) in the .

A  $\left. \begin{array}{l} \frac{3}{4} = \frac{9}{12} \\ \frac{2}{3} = \frac{8}{12} \end{array} \right\} \frac{3}{4} \bigcirc \frac{2}{3}$

G  $\left. \begin{array}{l} \frac{1}{4} = \frac{3}{12} \\ \frac{1}{6} = \frac{2}{12} \end{array} \right\} \frac{1}{4} \bigcirc \frac{1}{6}$

M  $\left. \begin{array}{l} \frac{4}{7} = \frac{12}{21} \\ \frac{2}{3} = \frac{14}{21} \end{array} \right\} \frac{4}{7} \bigcirc \frac{2}{3}$

B  $\left. \begin{array}{l} \frac{4}{9} = \frac{8}{18} \\ \frac{1}{2} = \frac{9}{18} \end{array} \right\} \frac{4}{9} \bigcirc \frac{1}{2}$

H  $\left. \begin{array}{l} \frac{7}{5} = \frac{49}{35} \\ \frac{9}{7} = \frac{45}{35} \end{array} \right\} \frac{7}{5} \bigcirc \frac{9}{7}$

N  $\left. \begin{array}{l} 5 = \frac{25}{5} \\ \frac{26}{5} = \frac{26}{5} \end{array} \right\} 5 \bigcirc \frac{26}{5}$

C  $\left. \begin{array}{l} \frac{1}{8} = \frac{7}{56} \\ \frac{1}{7} = \frac{8}{56} \end{array} \right\} \frac{1}{8} \bigcirc \frac{1}{7}$

I  $\left. \begin{array}{l} \frac{8}{5} = \frac{48}{30} \\ \frac{10}{6} = \frac{50}{30} \end{array} \right\} \frac{8}{5} \bigcirc \frac{10}{6}$

O  $\left. \begin{array}{l} \frac{7}{8} = \frac{63}{72} \\ \frac{6}{9} = \frac{48}{72} \end{array} \right\} \frac{7}{8} \bigcirc \frac{6}{9}$

D  $\left. \begin{array}{l} 6 = \frac{24}{4} \\ \frac{23}{4} = \frac{23}{4} \end{array} \right\} 6 \bigcirc \frac{23}{4}$

J  $\left. \begin{array}{l} \frac{3}{5} = \frac{12}{20} \\ \frac{3}{4} = \frac{15}{20} \end{array} \right\} \frac{3}{5} \bigcirc \frac{3}{4}$

P  $\left. \begin{array}{l} \frac{7}{3} = \frac{28}{12} \\ \frac{9}{4} = \frac{27}{12} \end{array} \right\} \frac{7}{3} \bigcirc \frac{9}{4}$

E  $\left. \begin{array}{l} \frac{2}{3} = \frac{10}{15} \\ \frac{3}{5} = \frac{9}{15} \end{array} \right\} \frac{2}{3} \bigcirc \frac{3}{5}$

K  $\left. \begin{array}{l} \frac{5}{6} = \frac{10}{12} \\ \frac{3}{4} = \frac{9}{12} \end{array} \right\} \frac{5}{6} \bigcirc \frac{3}{4}$

Q  $\left. \begin{array}{l} \frac{3}{8} = \frac{9}{24} \\ \frac{1}{3} = \frac{8}{24} \end{array} \right\} \frac{3}{8} \bigcirc \frac{1}{3}$

F  $\left. \begin{array}{l} \frac{5}{8} = \frac{15}{24} \\ \frac{4}{6} = \frac{16}{24} \end{array} \right\} \frac{5}{8} \bigcirc \frac{4}{6}$

L  $\left. \begin{array}{l} \frac{3}{7} = \frac{9}{21} \\ \frac{1}{3} = \frac{7}{21} \end{array} \right\} \frac{3}{7} \bigcirc \frac{1}{3}$

R  $\left. \begin{array}{l} 4 = \frac{16}{4} \\ \frac{15}{4} = \frac{15}{4} \end{array} \right\} 4 \bigcirc \frac{15}{4}$

2. Solve each short story problem.

A 10 cm.  $\frac{3}{4}$  decimetre.

Which is longer? 10 cm

B 40 seconds.  $\frac{3}{4}$  minute.

Which is longer?  $\frac{3}{4}$  min

C 16 weeks.  $\frac{1}{4}$  year.

Which is longer? 16 wk

D 18 eggs. 1 dozen eggs.

Which is more? 18 eggs

$$\begin{array}{r} 13 \\ 4 \overline{) 52} \\ \underline{4} \phantom{0} \\ 12 \end{array}$$



1. Give 6 fractions that are equivalent to the given fraction.

A  $\left\{ \frac{4}{9}, \frac{8}{18}, \frac{12}{27}, \frac{16}{36}, \frac{20}{45}, \frac{24}{54}, \frac{28}{63} \right\}$

B  $\left\{ \frac{4}{3}, \frac{8}{6}, \frac{12}{9}, \frac{16}{12}, \frac{20}{15}, \frac{24}{18}, \frac{28}{21} \right\}$

2. Give the lowest-terms fraction for each fraction.

A  $\frac{12}{16} = \frac{3}{4}$

B  $\frac{10}{14} = \frac{5}{7}$

C  $\frac{9}{24} = \frac{3}{8}$

D  $\frac{16}{52} = \frac{4}{13}$

E  $\frac{25}{55} = \frac{5}{11}$

3. Ring the number-line point for the fractional number indicated by the set of equivalent fractions.

$\left\{ \frac{5}{8}, \frac{10}{16}, \frac{15}{24}, \frac{20}{32}, \dots \right\}$



4. Give the lowest-terms fraction in the set for the point over the colored arrow. Then give the next 3 fractions in the set of equivalent fractions for this number.

$\left\{ \frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20}, \dots \right\}$



5. Give the missing numerators. Then give the correct sign ( $<$  or  $>$ ) in each  $\bullet$ .

A  $\frac{3}{4} = \frac{15}{20}$   $\frac{4}{5} = \frac{16}{20}$   $\frac{3}{4} \bullet \frac{4}{5}$

B  $\frac{6}{5} = \frac{42}{35}$   $\frac{8}{7} = \frac{40}{35}$   $\frac{6}{5} \bullet \frac{8}{7}$

6. Give the correct sign ( $<$ ,  $=$ , or  $>$ ) in each  $\bullet$ .

A  $\frac{4}{8} \bullet \frac{9}{18}$

C  $\frac{4}{7} \bullet \frac{4}{9}$

B  $\frac{3}{9} \bullet \frac{1}{4}$

D  $\frac{2}{3} \bullet \frac{18}{27}$

## CHANGE OF PACE

Use parentheses ( , ) and any of the symbols  $+$ ,  $-$ ,  $\times$ ,  $\div$  to make the following sentences true.

1.  $(4 \bullet 4) \bullet 4 = 0$

2.  $(4 \bullet 4) \bullet 4 = 2$

3.  $4 \bullet (4 \bullet 4) = 3$

4.  $(4 \bullet 4) \bullet 4 = 4$

5.  $4 \bullet (4 \bullet 4) = 5$

6.  $4 \bullet 4 \bullet 4 = 12$

7.  $(4 \bullet 4) \bullet 4 = 20$

8.  $(4 \bullet 4) \bullet 4 = 32$

9.  $4 \bullet 4 \bullet 4 = 64$

(More than one answer is possible in some cases.)

# Addition and Subtraction of Fractional Numbers ● Finding Sums and Differences

For each exercise, list as many equivalent fractions as you need to find two fractions with the same denominator. Then give the equivalent fractions in each and the sum or difference in each.

Problem	Sets of equivalent fractions	Sum or difference
1. $\frac{1}{4} + \frac{3}{5}$	$\left\{ \frac{1}{4}, \frac{2}{8}, \frac{3}{12}, \frac{4}{16}, \frac{5}{20} \right\}$ $\left\{ \frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20} \right\}$	$\frac{5}{20} + \frac{12}{20} = \frac{17}{20}$
2. $\frac{5}{8} + \frac{5}{6}$	$\left\{ \frac{5}{8}, \frac{10}{16}, \frac{15}{24} \right\}$ $\left\{ \frac{5}{6}, \frac{10}{12}, \frac{15}{18}, \frac{20}{24} \right\}$	$\frac{15}{24} + \frac{20}{24} = \frac{35}{24}$
3. $\frac{4}{3} - \frac{3}{4}$	$\left\{ \frac{4}{3}, \frac{8}{6}, \frac{12}{9}, \frac{16}{12} \right\}$ $\left\{ \frac{3}{4}, \frac{6}{8}, \frac{9}{12} \right\}$	$\frac{16}{12} - \frac{9}{12} = \frac{7}{12}$
4. $\frac{7}{8} - \frac{3}{5}$	$\left\{ \frac{7}{8}, \frac{14}{16}, \frac{21}{24}, \frac{28}{32}, \frac{35}{40} \right\}$ $\left\{ \frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20}, \dots, \frac{24}{40} \right\}$	$\frac{35}{40} - \frac{24}{40} = \frac{11}{40}$
5. $\frac{4}{4} + \frac{5}{6}$	$\left\{ \frac{4}{4}, \frac{8}{8}, \frac{12}{12} \right\}$ $\left\{ \frac{5}{6}, \frac{10}{12} \right\}$	$\frac{12}{12} + \frac{10}{12} = \frac{22}{12}$
6. $\frac{4}{5} - \frac{3}{7}$	$\left\{ \frac{4}{5}, \frac{8}{10}, \frac{12}{15}, \dots, \frac{28}{35} \right\}$ $\left\{ \frac{3}{7}, \dots, \frac{15}{35} \right\}$	$\frac{28}{35} - \frac{15}{35} = \frac{13}{35}$

1. A Is 10 a multiple of 8? No

B Is  $2 \times 10$  a multiple of 8? No

C Is  $3 \times 10$  a multiple of 8? No

D Is  $4 \times 10$  a multiple of 8? Yes

E When you have found the **least common multiple** of 10 and 8 you have found the **least common denominator** for  $\frac{3}{10}$  and  $\frac{5}{8}$ .

What is this number? 40

F In each problem below, give the **least common denominator** in each. Then give the missing numerators and find the sum or difference.

$$\frac{3}{10} = \frac{12}{40}$$

$$\frac{5}{8} = \frac{25}{40}$$

$$\begin{array}{r} \frac{3}{10} = \frac{12}{40} \\ + \frac{5}{8} = \frac{25}{40} \\ \hline \frac{37}{40} \end{array}$$

$$\begin{array}{r} \frac{5}{8} = \frac{25}{40} \\ - \frac{3}{10} = \frac{12}{40} \\ \hline \frac{13}{40} \end{array}$$

2. In each problem, first give the least common denominator in each. Then give the correct numerators and find the sum or difference.

A  $\frac{5}{6} = \frac{10}{12}$

B  $\frac{3}{5} = \frac{9}{15}$

C  $\frac{2}{10} = \frac{6}{30}$

D  $\frac{5}{8} = \frac{15}{24}$

$$\begin{array}{r} + \frac{3}{4} = \frac{9}{12} \\ \hline \frac{19}{12} \text{ or } 1\frac{7}{12} \end{array}$$

$$\begin{array}{r} + \frac{2}{3} = \frac{10}{15} \\ \hline \frac{19}{15} \text{ or } 1\frac{4}{15} \end{array}$$

$$\begin{array}{r} + \frac{6}{15} = \frac{12}{30} \\ \hline \frac{18}{30} \text{ or } \frac{3}{5} \end{array}$$

$$\begin{array}{r} + \frac{1}{6} = \frac{4}{24} \\ \hline \frac{19}{24} \end{array}$$

E  $\frac{5}{6} = \frac{15}{18}$

F  $\frac{7}{12} = \frac{7}{12}$

G  $\frac{3}{10} = \frac{9}{30}$

H  $\frac{4}{5} = \frac{16}{20}$

$$\begin{array}{r} - \frac{2}{9} = \frac{4}{18} \\ \hline \frac{11}{18} \end{array}$$

$$\begin{array}{r} - \frac{1}{4} = \frac{3}{12} \\ \hline \frac{4}{12} \text{ or } \frac{1}{3} \end{array}$$

$$\begin{array}{r} - \frac{4}{15} = \frac{8}{30} \\ \hline \frac{1}{30} \end{array}$$

$$\begin{array}{r} - \frac{1}{4} = \frac{5}{20} \\ \hline \frac{11}{20} \end{array}$$

I  $\frac{3}{7} + \frac{2}{3}$

J  $\frac{1}{2} + \frac{2}{3}$

K  $\frac{9}{11} + \frac{2}{5}$

$$\frac{9}{21} + \frac{14}{21} = \frac{23}{21} \text{ or } 1\frac{2}{21}$$

$$\frac{3}{6} + \frac{4}{6} = \frac{7}{6} \text{ or } 1\frac{1}{6}$$

$$\frac{45}{55} + \frac{22}{55} = \frac{67}{55} \text{ or } 1\frac{12}{55}$$



1. Sleeping:  $\frac{1}{3}$  of the day.  
Eating:  $\frac{1}{8}$  of the day.  
What part of the day was spent for sleeping

and eating?  $\underline{\frac{11}{24}}$



2. Morning: gas tank  $\frac{3}{4}$  full.  
Evening: tank  $\frac{3}{8}$  full.  
What part of a tank of gas was used during the day?  $\underline{\frac{3}{8}}$

3. Tuesday: complete  $\frac{4}{8}$  of the trip.  
Wednesday: complete another  $\frac{1}{6}$  of the trip. What part of the trip

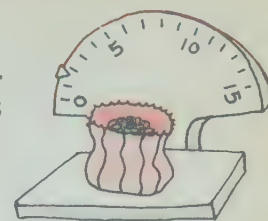
is completed?  $\underline{\frac{2}{3}}$

4. Delivered  $\frac{3}{4}$  tonne of coal. Then delivered  $\frac{1}{5}$  tonne. Delivered what part of a tonne of coal in all?  $\underline{\frac{19}{20} \text{ tonne}}$

5. Dancing lesson:  $\frac{2}{3}$  hour.  
Music lesson:  $\frac{3}{4}$  hour.  
How much longer was the music lesson?  $\underline{\frac{1}{12} h}$

6. Peanuts:  $\frac{5}{6}$  kilogram.  
Cashews:  $\frac{4}{9}$  kilogram.  
How many kilograms

of nuts?  $\underline{1\frac{5}{18} kg}$



7. Paul: woke up  $\frac{3}{4}$  hour before sunrise.  
Jeff: woke up  $\frac{7}{10}$  hour before sunrise.

Who woke up earlier?  $\underline{\text{Paul}}$

How much earlier?  $\underline{\frac{1}{20} h}$

8. Recipe:  $\frac{3}{4}$  litre of milk.  
 $\frac{1}{5}$  litre of vegetable oil.  
How much more milk than

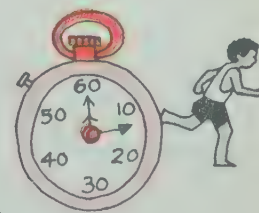
vegetable oil?  $\underline{\frac{11}{20} \text{ litre}}$



9. Antifreeze: 1 litre. Spilled about  $\frac{3}{8}$  litre. About what part of a litre was left?  $\underline{\frac{5}{8} \text{ litre}}$

10. Ran:  $\frac{1}{6}$  hour.  
Walked:  $\frac{5}{8}$  hour.  
Rested: the remainder of the hour.

Rested what part of the hour?  $\underline{\frac{5}{24} h}$



1. Give a whole number in each . Then give the mixed numeral in each .

A  $\frac{12}{3} = 4 \rightarrow \frac{13}{3} = 4\frac{1}{3}$

D  $\frac{24}{6} = 4 \rightarrow \frac{28}{6} = 4\frac{4}{6}$

B  $\frac{8}{4} = 2 \rightarrow \frac{10}{4} = 2\frac{2}{4}$

E  $\frac{18}{3} = 6 \rightarrow \frac{20}{3} = 6\frac{2}{3}$

C  $\frac{15}{3} = 5 \rightarrow \frac{17}{3} = 5\frac{2}{3}$

F  $\frac{16}{2} = 8 \rightarrow \frac{17}{2} = 8\frac{1}{2}$

2. Give the missing numerator in each . Then give the improper fraction in each .

A  $3\frac{1}{4} = \frac{12}{4} + \frac{1}{4} = \frac{13}{4}$

D  $4\frac{1}{6} = \frac{24}{6} + \frac{1}{6} = \frac{25}{6}$

B  $6\frac{1}{3} = \frac{18}{3} + \frac{1}{3} = \frac{19}{3}$

E  $1\frac{5}{8} = \frac{8}{8} + \frac{5}{8} = \frac{13}{8}$

C  $3\frac{2}{5} = \frac{15}{5} + \frac{2}{5} = \frac{17}{5}$

F  $2\frac{3}{7} = \frac{14}{7} + \frac{3}{7} = \frac{17}{7}$

3. Write a mixed numeral for each improper fraction.

A  $\frac{5}{3} = 1\frac{2}{3}$

C  $\frac{11}{10} = 1\frac{1}{10}$

E  $\frac{16}{7} = 2\frac{2}{7}$

G  $\frac{38}{7} = 5\frac{3}{7}$

B  $\frac{7}{2} = 3\frac{1}{2}$

D  $\frac{21}{4} = 5\frac{1}{4}$

F  $\frac{25}{3} = 8\frac{1}{3}$

H  $\frac{51}{4} = 12\frac{3}{4}$

4. Write an improper fraction for each mixed numeral.

A  $1\frac{3}{4} = \frac{7}{4}$

C  $2\frac{1}{5} = \frac{11}{5}$

E  $9\frac{1}{3} = \frac{28}{3}$

G  $4\frac{7}{8} = \frac{39}{8}$

B  $1\frac{9}{10} = \frac{19}{10}$

D  $6\frac{3}{5} = \frac{33}{5}$

F  $3\frac{10}{11} = \frac{43}{11}$

H  $5\frac{2}{3} = \frac{17}{3}$

5. Give the missing numerators.

A  $5\frac{3}{4} = 5\frac{6}{8} = 4\frac{14}{8}$

C  $8\frac{2}{5} = 8\frac{6}{15} = 7\frac{21}{15}$

B  $7\frac{1}{3} = 7\frac{3}{9} = 6\frac{12}{9}$

D  $7\frac{2}{3} = 7\frac{4}{6} = 6\frac{10}{6}$

6. Give the missing numerators. Then give the mixed numeral with a lowest-terms fraction.

A  $4\frac{6}{4} = 5\frac{2}{4} = 5\frac{1}{2}$

C  $1\frac{10}{6} = 2\frac{4}{6} = 2\frac{2}{3}$

B  $6\frac{12}{9} = 7\frac{3}{9} = 7\frac{1}{3}$

D  $3\frac{10}{8} = 4\frac{2}{8} = 4\frac{1}{4}$

1. Because of the **commutative** and **associative** principles, you may choose any two addends to add first. Give the missing numbers.

Find the sum of these addends.

$$3\frac{5}{8} + 2\frac{1}{4} = (3 + \frac{5}{8}) + (2 + \frac{1}{4}) = \underline{5} + \underline{\frac{7}{8}} = 5\frac{7}{8}$$

Then find the sum of these addends.

2. Give the correct whole number in the black blank. Then give the correct fraction in the red blank. Finally, give the sum in the     .

A  $5\frac{1}{3} + 3\frac{1}{4} = (5 + \frac{1}{3}) + (3 + \frac{1}{4}) = \underline{8} + \underline{\frac{7}{12}} = 8\frac{7}{12}$

B  $2\frac{1}{2} + 6\frac{3}{8} = (2 + \frac{1}{2}) + (6 + \frac{3}{8}) = \underline{8} + \underline{\frac{7}{8}} = 8\frac{7}{8}$

C  $4\frac{3}{10} + 7\frac{2}{5} = (4 + \frac{3}{10}) + (7 + \frac{2}{5}) = \underline{11} + \underline{\frac{7}{10}} = 11\frac{7}{10}$

3. Find the sums.

A 
$$\begin{array}{r} 2\frac{1}{3} \\ + 9\frac{7}{9} \\ \hline 11\frac{8}{9} \end{array}$$

B 
$$\begin{array}{r} 3\frac{1}{6} \\ + 8\frac{3}{4} \\ \hline 11\frac{11}{12} \end{array}$$

C 
$$\begin{array}{r} 5\frac{5}{8} \\ + 9\frac{1}{6} \\ \hline 14\frac{19}{24} \end{array}$$

D 
$$\begin{array}{r} 3\frac{3}{4} \\ + 6\frac{2}{3} \\ \hline 10\frac{5}{12} \end{array}$$

4. Find the differences.

A 
$$\begin{array}{r} 12\frac{1}{2} \\ - 8\frac{1}{4} \\ \hline 4\frac{1}{4} \end{array}$$

B 
$$\begin{array}{r} 16\frac{3}{4} \\ - 9\frac{3}{8} \\ \hline 7\frac{3}{8} \end{array}$$

C 
$$\begin{array}{r} 21\frac{7}{8} \\ - 12\frac{2}{3} \\ \hline 9\frac{5}{24} \end{array}$$

D 
$$\begin{array}{r} 56\frac{9}{10} \\ - 32\frac{1}{4} \\ \hline 24\frac{13}{20} \end{array}$$

5. Give the missing numerators. Then find the differences.

A 
$$\begin{array}{r} 5\frac{1}{2} = 5\frac{2}{4} = 4\frac{6}{4} \\ - 3\frac{3}{4} = 3\frac{3}{4} = 3\frac{3}{4} \\ \hline 1\frac{3}{4} \end{array}$$

B 
$$\begin{array}{r} 12\frac{1}{8} = 12\frac{1}{8} = 11\frac{9}{8} \\ - 6\frac{3}{4} = 6\frac{6}{8} = 6\frac{6}{8} \\ \hline 5\frac{3}{8} \end{array}$$

C 
$$\begin{array}{r} 8 = 7\frac{9}{9} \\ - 2\frac{5}{9} = 2\frac{5}{9} \\ \hline 5\frac{4}{9} \end{array}$$

6. Find the differences.

A 
$$\begin{array}{r} 6\frac{1}{3} \\ - 2\frac{5}{6} \\ \hline 3\frac{1}{2} \end{array}$$

B 
$$\begin{array}{r} 37\frac{1}{2} \\ - 29\frac{9}{10} \\ \hline 7\frac{3}{5} \end{array}$$

C 
$$\begin{array}{r} 9\frac{1}{3} \\ - 3\frac{4}{7} \\ \hline 5\frac{16}{21} \end{array}$$

D 
$$\begin{array}{r} 128\frac{1}{5} \\ - 83\frac{1}{3} \\ \hline 44\frac{13}{15} \end{array}$$



1. To find the least common denominator for three or more fractional numbers, find the least common multiple (LCM) of two of the denominators at a time.

$\frac{5}{6}$	List some multiples of 6: $\{ \underline{6, 12, 18, 24, 30, \dots} \}$	}	The LCM of 6 and 4 is <u>12</u> .
$\frac{3}{4}$	List some multiples of 4: $\{ \underline{4, 8, 12, 16, 20, 24, \dots} \}$		
$\frac{1}{8}$	List some multiples of 8: $\{ \underline{8, 16, 24, 32, 40, \dots} \}$		
$+$	List some multiples of 12: $\{ \underline{12, 24, 36, 48, \dots} \}$		

What is the LCM of 12 and 8? 24

The least common denominator for  $\frac{5}{6}$ ,  $\frac{3}{4}$ , and  $\frac{1}{8}$  is 24.

2. Find the sums. Give the sums in lowest terms.

<p><b>A</b></p> $\begin{array}{r} \frac{1}{2} \\ \frac{2}{7} \\ + \frac{3}{14} \\ \hline 1 \end{array}$	<p><b>B</b></p> $\begin{array}{r} \frac{3}{8} \\ \frac{1}{12} \\ + \frac{5}{6} \\ \hline 1\frac{7}{24} \end{array}$	<p><b>C</b></p> $\begin{array}{r} \frac{3}{10} \\ \frac{4}{5} \\ + \frac{1}{4} \\ \hline 1\frac{7}{20} \end{array}$	<p><b>D</b></p> $\begin{array}{r} \frac{7}{10} \\ \frac{3}{5} \\ + \frac{2}{15} \\ \hline 1\frac{13}{20} \end{array}$
<p><b>E</b></p> $\begin{array}{r} 3\frac{1}{8} \\ 8\frac{3}{4} \\ + 9\frac{5}{6} \\ \hline 21\frac{17}{24} \end{array}$	<p><b>F</b></p> $\begin{array}{r} 12\frac{1}{6} \\ 2\frac{2}{9} \\ + 10\frac{3}{4} \\ \hline 25\frac{5}{36} \end{array}$	<p><b>G</b></p> $\begin{array}{r} 52\frac{1}{8} \\ 48\frac{3}{16} \\ + 7\frac{1}{4} \\ \hline 107\frac{9}{16} \end{array}$	<p><b>H</b></p> $\begin{array}{r} 397\frac{1}{10} \\ 285\frac{3}{5} \\ + 600\frac{5}{8} \\ \hline 1283\frac{13}{40} \end{array}$

3. Solve each story problem.

<p><b>A</b> Mrs. Komo purchased <math>1\frac{1}{4}</math> m of lining, <math>3\frac{3}{8}</math> m of dress fabric, and <math>1\frac{1}{2}</math> m of trim. What was the total length?</p> <p style="text-align: center;"><u><math>6\frac{1}{8}</math> m</u></p>	<p><b>B</b> Scott weighs <math>32\frac{1}{8}</math> kg. David weighs <math>27\frac{5}{6}</math> kg. Sam weighs <math>30\frac{3}{4}</math> kg. What is their total weight?</p> <p style="text-align: center;"><u><math>90\frac{3}{16}</math> kg</u></p>
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Find the quotient and remainder in part A. Use it to help you write the correct mixed numeral in part B.

1. A  $\overline{24} \text{ r } 1$   
 $4 \overline{) 97}$

B  $\frac{97}{4} = \underline{24\frac{1}{4}}$

2. A  $\overline{24} \text{ r } 3$   
 $5 \overline{) 123}$

B  $\frac{123}{5} = \underline{24\frac{3}{5}}$

3. A  $\overline{13} \text{ r } 1$   
 $6 \overline{) 79}$

B  $\frac{79}{6} = \underline{13\frac{1}{6}}$

4. A  $\overline{45} \text{ r } 2$   
 $3 \overline{) 137}$

B  $\frac{137}{3} = \underline{45\frac{2}{3}}$

5. A  $\overline{41} \text{ r } 4$   
 $8 \overline{) 332}$

B  $\frac{332}{8} = \underline{41\frac{4}{8}}$

6. A  $\overline{65} \text{ r } 1$   
 $7 \overline{) 456}$

B  $\frac{456}{7} = \underline{65\frac{1}{7}}$

7. A  $\overline{58} \text{ r } 3$   
 $5 \overline{) 293}$

B  $\frac{293}{5} = \underline{58\frac{3}{5}}$

8. A  $\overline{57} \text{ r } 3$   
 $4 \overline{) 231}$

B  $\frac{231}{4} = \underline{57\frac{3}{4}}$

9. A  $\overline{62} \text{ r } 2$   
 $9 \overline{) 560}$

B  $\frac{560}{9} = \underline{62\frac{2}{9}}$

10. A  $\overline{64} \text{ r } 1$   
 $6 \overline{) 385}$

B  $\frac{385}{6} = \underline{64\frac{1}{6}}$

11. A  $\overline{98} \text{ r } 1$   
 $2 \overline{) 197}$

B  $\frac{197}{2} = \underline{98\frac{1}{2}}$

12. A  $\overline{89} \text{ r } 2$   
 $3 \overline{) 269}$

B  $\frac{269}{3} = \underline{89\frac{2}{3}}$

1. Find the sums and differences.

A  $\frac{1}{8} + \frac{5}{8} = \underline{\frac{3}{4}}$

B  $\frac{9}{10} - \frac{3}{10} = \underline{\frac{3}{5}}$

C  $\frac{8}{15} - \frac{1}{5} = \underline{\frac{1}{3}}$

2. Write an improper fraction for each mixed numeral.

A  $5\frac{1}{8} = \underline{\frac{41}{8}}$

B  $7\frac{1}{6} = \underline{\frac{43}{6}}$

C  $2\frac{7}{8} = \underline{\frac{23}{8}}$

D  $16\frac{2}{3} = \underline{\frac{50}{3}}$

3. Write a mixed numeral for each improper fraction.

A  $\frac{35}{3} = \underline{11\frac{2}{3}}$

B  $\frac{30}{8} = \underline{3\frac{3}{4}}$

C  $\frac{76}{6} = \underline{12\frac{2}{3}}$

D  $\frac{219}{10} = \underline{21\frac{9}{10}}$

4. Find the sums.

A 
$$\begin{array}{r} \frac{7}{10} \\ + \frac{3}{5} \\ \hline 1\frac{3}{10} \end{array}$$

B 
$$\begin{array}{r} 6\frac{1}{3} \\ + 3\frac{1}{8} \\ \hline 9\frac{11}{24} \end{array}$$

C 
$$\begin{array}{r} 28\frac{4}{5} \\ + 49\frac{3}{4} \\ \hline 78\frac{11}{20} \end{array}$$

D 
$$\begin{array}{r} 18\frac{3}{8} \\ + 36\frac{1}{5} \\ \hline 54\frac{23}{40} \end{array}$$

5. Find the differences.

A 
$$\begin{array}{r} \frac{5}{9} \\ - \frac{1}{6} \\ \hline \frac{7}{18} \end{array}$$

B 
$$\begin{array}{r} 5\frac{1}{4} \\ - 2\frac{4}{7} \\ \hline 2\frac{19}{28} \end{array}$$

C 
$$\begin{array}{r} 56\frac{5}{12} \\ - 38\frac{7}{8} \\ \hline 17\frac{13}{24} \end{array}$$

D 
$$\begin{array}{r} 100 \\ - 37\frac{5}{6} \\ \hline 32\frac{1}{6} \end{array}$$

## CHANGE OF PACE

Complete the **magic squares**. The row sums, column sums, and the sums from one corner to another should be the same.

1.

17	3	4	14
6	12	11	9
10	8	7	13
5	15	16	2

2.

39	25	26	36
28	34	33	31
32	30	29	35
27	37	38	24

3.

65	51	52	62
54	60	59	57
58	56	55	61
53	63	64	50




1.



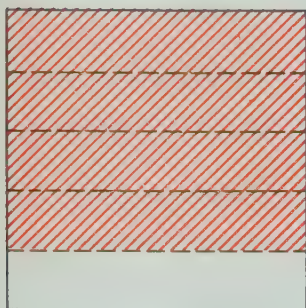
$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

**A** Shade  $\frac{1}{3}$  of the region red. (see )

**B** Shade  $\frac{1}{2}$  of the red region gray. (see )

**C** In the blank show what part of the complete region has been shaded both red and gray.

2.



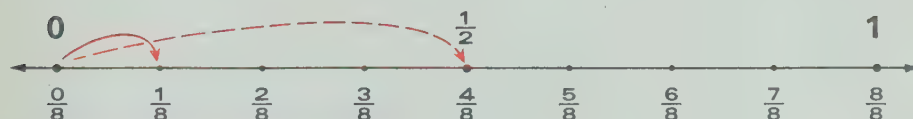
$$4 \times \frac{1}{5} = \frac{4}{5}$$

**A** Shade  $\frac{1}{5}$  of the region red. (see )

**B** Do part A 4 times. (see )

**C** In the blank show what part of the region is now shaded red.

3.



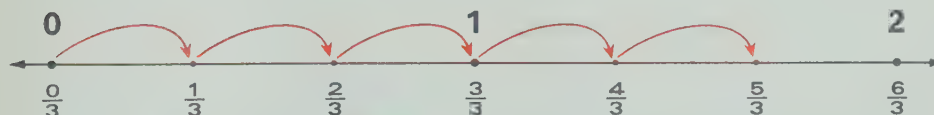
$$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

**A** Think of a jump to  $\frac{1}{2}$ .

**B** Show a jump  $\frac{1}{4}$  of the way to  $\frac{1}{2}$ .

**C** In the blank, give the number of the landing point for the jump in part B.

4.



$$5 \times \frac{1}{3} = \frac{5}{3}$$

**A** Show 5 jumps of  $\frac{1}{3}$ .

**B** In the blank, give the number of the landing point.

5. Find the products.

**A**  $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$

**D**  $9 \times \frac{1}{5} = \frac{9}{5}$

**G**  $\frac{1}{100} \times \frac{1}{10} = \frac{1}{1000}$

**B**  $4 \times \frac{1}{11} = \frac{4}{11}$

**E**  $\frac{1}{10} \times \frac{1}{12} = \frac{1}{120}$

**H**  $7 \times \frac{1}{10} = \frac{7}{10}$

**C**  $\frac{1}{3} \times \frac{1}{10} = \frac{1}{30}$

**F**  $12 \times \frac{1}{5} = \frac{12}{5}$

**I**  $\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$

1. Use the **0** and **1** principles to find the products.

A  $\frac{1}{6} \times 1 = \underline{\frac{1}{6}}$     C  $1 \times \frac{3}{8} = \underline{\frac{3}{8}}$     E  $\frac{7}{5} \times 1 = \underline{\frac{7}{5}}$     G  $\frac{0}{5} \times \frac{2}{2} = \underline{0}$

B  $\frac{1}{6} \times \frac{3}{3} = \underline{\frac{1}{6}}$     D  $\frac{1}{5} \times 0 = \underline{0}$     F  $\frac{1}{5} \times \frac{0}{3} = \underline{0}$     H  $\frac{5}{6} \times \frac{4}{4} = \underline{\frac{5}{6}}$

2. Use the **commutative principle** to find the products.

A  $5 \times \frac{1}{3} = \underline{\frac{5}{3}} \rightarrow \frac{1}{3} \times 5 = \underline{\frac{5}{3}}$     C  $9 \times \frac{1}{8} = \underline{\frac{9}{8}} \rightarrow \frac{1}{8} \times 9 = \underline{\frac{9}{8}}$

B  $3 \times \frac{1}{7} = \underline{\frac{3}{7}} \rightarrow \frac{1}{7} \times 3 = \underline{\frac{3}{7}}$     D  $12 \times \frac{1}{5} = \underline{\frac{12}{5}} \rightarrow \frac{1}{5} \times 12 = \underline{\frac{12}{5}}$

3. Use the **associative principle** to give the missing numbers. Then find the products.

A  $(5 \times \frac{1}{2}) \times \frac{1}{3} = 5 \times (\underline{\frac{1}{2}} \times \frac{1}{3}) = \underline{\frac{5}{6}}$     C  $(6 \times \frac{1}{4}) \times \frac{1}{3} = 6 \times (\frac{1}{4} \times \underline{\frac{1}{3}}) = \underline{\frac{6}{12}}$

B  $(8 \times \frac{1}{5}) \times \frac{1}{4} = \underline{8} \times (\frac{1}{5} \times \frac{1}{4}) = \underline{\frac{8}{20}}$     D  $(7 \times \frac{1}{6}) \times \frac{1}{5} = \underline{7} \times (\frac{1}{6} \times \frac{1}{5}) = \underline{\frac{7}{30}}$

4. Using the **commutative** and **associative principles**, you can arrange the factors in any way that is convenient. Give a whole number for each   . Give a fraction for each   . Then find the product.

A  $\boxed{\frac{3}{5} \times \frac{4}{3}} = (3 \times \frac{1}{5}) \times (4 \times \frac{1}{3}) = \underline{12} \times \underline{\frac{1}{15}} = \underline{\frac{12}{15}}$

B  $\boxed{\frac{2}{5} \times \frac{3}{8}} = (2 \times \frac{1}{5}) \times (3 \times \frac{1}{8}) = \underline{6} \times \underline{\frac{1}{40}} = \underline{\frac{6}{40}}$

C  $\boxed{\frac{5}{8} \times \frac{5}{6}} = (5 \times \frac{1}{8}) \times (5 \times \frac{1}{6}) = \underline{25} \times \underline{\frac{1}{48}} = \underline{\frac{25}{48}}$

5. Find the products.

A  $\frac{3}{4} \times \frac{5}{6} = \underline{\frac{15}{24}}$     C  $\frac{5}{16} \times \frac{2}{3} = \underline{\frac{10}{48}}$     E  $\frac{5}{6} \times \frac{2}{3} = \underline{\frac{10}{18}}$     G  $\frac{5}{8} \times \frac{3}{2} = \underline{\frac{15}{16}}$

B  $\frac{3}{10} \times \frac{4}{5} = \underline{\frac{12}{50}}$     D  $\frac{4}{7} \times \frac{5}{9} = \underline{\frac{20}{63}}$     F  $\frac{2}{3} \times \frac{7}{10} = \underline{\frac{14}{30}}$     H  $\frac{3}{7} \times \frac{2}{9} = \underline{\frac{6}{63}}$

1. Use the **distributive principle** to give the missing numbers and to find the products. Use mixed numerals with lowest-terms fractions for the final product.

A  $5 \times 3\frac{1}{4} = (5 \times 3) + (5 \times \frac{1}{4}) = \underline{15} + \underline{\frac{5}{4}} = \underline{16\frac{1}{4}}$

B  $8 \times 3\frac{1}{4} = (8 \times \underline{3}) + (8 \times \underline{\frac{1}{4}}) = \underline{24} + \underline{\frac{8}{4}} = \underline{26}$

C  $\frac{1}{2} \times 2\frac{1}{3} = (\underline{\frac{1}{2}} \times 2) + (\underline{\frac{1}{2}} \times \underline{\frac{1}{3}}) = \underline{\frac{2}{2}} + \underline{\frac{1}{6}} = \underline{1\frac{1}{6}}$

D  $\frac{1}{3} \times 6\frac{3}{4} = (\frac{1}{3} \times \underline{6}) + (\frac{1}{3} \times \underline{\frac{3}{4}}) = \underline{\frac{6}{3}} + \underline{\frac{3}{12}} = \underline{2\frac{1}{4}}$

E  $1\frac{1}{2} \times 6 = (1 \times \underline{6}) + (\frac{1}{2} \times \underline{6}) = \underline{6} + \underline{\frac{6}{2}} = \underline{9}$

F  $7 \times 3\frac{1}{5} = (7 \times \underline{3}) + (7 \times \underline{\frac{1}{5}}) = \underline{21} + \underline{\frac{7}{5}} = \underline{22\frac{2}{5}}$

G  $\frac{1}{6} \times 1\frac{1}{2} = (\frac{1}{6} \times \underline{1}) + (\frac{1}{6} \times \underline{\frac{1}{2}}) = \underline{\frac{1}{6}} + \underline{\frac{1}{12}} = \underline{\frac{1}{4}}$

2. Find the products by first replacing each mixed numeral with an improper fraction as in the example.

Write the correct improper fraction in each     . Then write a mixed numeral for the final product in the     .

A  $1\frac{1}{3} \times 2\frac{1}{5} = \underline{2\frac{14}{15}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{4}{3} \times \frac{11}{5} = \frac{44}{15}$

D  $\frac{4}{5} \times 2\frac{2}{3} = \underline{2\frac{2}{15}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{4}{5} \times \frac{8}{3} = \frac{32}{15}$

G  $3\frac{1}{2} \times 5\frac{2}{5} = \underline{18\frac{9}{10}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{7}{2} \times \frac{27}{5} = \frac{189}{10}$

B  $2\frac{1}{2} \times 1\frac{3}{4} = \underline{4\frac{3}{8}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{5}{2} \times \frac{7}{4} = \frac{35}{8}$

E  $4 \times 3\frac{1}{4} = \underline{13}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $4 \times \frac{13}{4} = \frac{13}{1}$

H  $8 \times 1\frac{5}{6} = \underline{14\frac{2}{3}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $8 \times \frac{11}{6} = \frac{44}{3}$

C  $2\frac{1}{3} \times 1\frac{1}{2} = \underline{3\frac{1}{2}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{7}{3} \times \frac{3}{2} = \frac{21}{6}$

F  $1\frac{1}{4} \times 2\frac{1}{3} = \underline{2\frac{11}{12}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{5}{4} \times \frac{7}{3} = \frac{35}{12}$

I  $4\frac{1}{2} \times 5\frac{2}{3} = \underline{25\frac{1}{2}}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $\frac{9}{2} \times \frac{17}{3} = \frac{51}{2}$



1. Find the products. Use an improper fraction in each and a whole number for each blank.

A  $\frac{2}{7} \times \frac{7}{2} = \frac{14}{14} = \underline{1}$

D  $\frac{3}{1} \times \frac{1}{3} = \frac{3}{3} = \underline{1}$

B  $\frac{8}{3} \times \frac{3}{8} = \frac{24}{24} = \underline{1}$

E  $\frac{1}{9} \times 9 = \frac{9}{9} = \underline{1}$

C  $\frac{4}{5} \times \frac{5}{4} = \frac{20}{20} = \underline{1}$

F  $100 \times \frac{1}{100} = \frac{100}{100} = \underline{1}$

If the product of two fractional numbers is 1, each number is the **reciprocal** of the other.

2. Give the reciprocal of each number.

A  $\frac{3}{4} \underline{\frac{4}{3}}$

D  $5 \underline{\frac{1}{5}}$

G  $\frac{2}{3} \underline{\frac{3}{2}}$

J  $1\frac{1}{4} \underline{\frac{4}{5}}$

B  $\frac{1}{6} \underline{6}$

E  $\frac{7}{10} \underline{\frac{10}{7}}$

H  $2 \underline{\frac{1}{2}}$

K  $1 \underline{1}$

C  $54 \underline{\frac{1}{54}}$

F  $12\frac{1}{2} \underline{\frac{2}{25}}$

I  $2\frac{3}{4} \underline{\frac{4}{11}}$

L  $33\frac{1}{3} \underline{\frac{3}{100}}$

3. Find the missing factors.

A  $\frac{5}{8} \times \underline{\frac{8}{5}} = 1$

D  $\frac{4}{5} \times \underline{\frac{5}{4}} = 1$

G  $1\frac{1}{3} \times \underline{\frac{3}{4}} = 1$

B  $\frac{1}{4} \times \underline{4} = 1$

E  $\underline{\frac{1}{2}} \times 2 = 1$

H  $8\frac{1}{2} \times \underline{\frac{2}{17}} = 1$

C  $\underline{\frac{3}{10}} \times \frac{10}{3} = 1$

F  $\frac{1}{16} \times \underline{16} = 1$

I  $\underline{1} \times 1 = 1$

4. Give a whole number for each . Then find the product.

A  $14 \times \frac{1}{2} = 7 \times (\underline{2} \times \frac{1}{2}) = \underline{7}$

E  $48 \times \frac{1}{6} = 8 \times (\underline{6} \times \frac{1}{6}) = \underline{8}$

B  $27 \times \frac{1}{3} = \underline{9} \times (3 \times \frac{1}{3}) = \underline{9}$

F  $100 \times \frac{1}{20} = \underline{5} \times (20 \times \frac{1}{20}) = \underline{5}$

C  $25 \times \frac{1}{5} = 5 \times (\underline{5} \times \frac{1}{5}) = \underline{5}$

G  $54 \times \frac{1}{6} = \underline{9} \times (6 \times \frac{1}{6}) = \underline{9}$

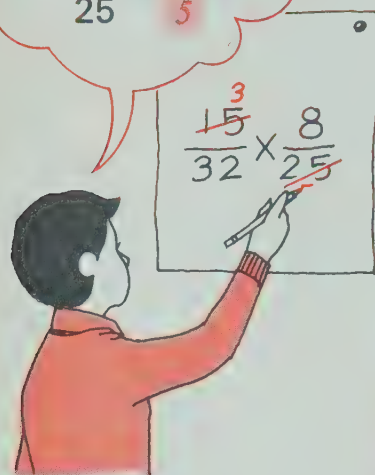
D  $18 \times \frac{1}{9} = \underline{2} \times (9 \times \frac{1}{9}) = \underline{2}$

H  $52 \times \frac{1}{4} = \underline{13} \times (4 \times \frac{1}{4}) = \underline{13}$

1. Give the numbers in each     to show what the boy is thinking. Study the way he does his work.

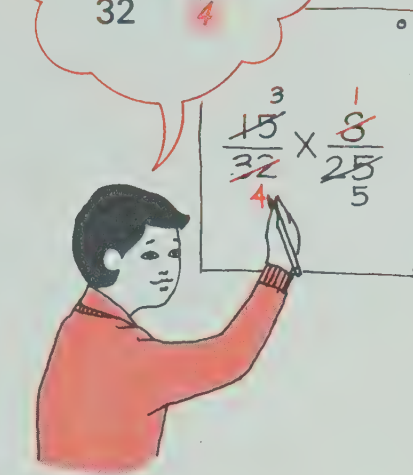
- A Both 15 and 25 can be divided by 5.

$$\frac{15}{25} = \frac{3}{5}$$



- B Both 8 and 32 can be divided by 8.

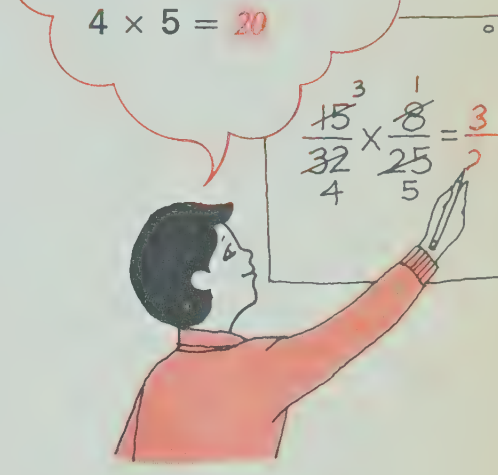
$$\frac{8}{32} = \frac{1}{4}$$



- C Multiply the numerators and denominators to find the product.

$$3 \times 1 = 3$$

$$4 \times 5 = 20$$



2. Use the short cut shown above to find the products.

A  $\frac{7}{12} \times \frac{18}{1} = \frac{21}{2}$

I  $\frac{10}{20} \times \frac{30}{100} = \frac{3}{20}$

Q  $\frac{4}{5} \times \frac{30}{40} = \frac{3}{5}$

B  $\frac{5}{21} \times 18 = \frac{30}{7}$

J  $\frac{4}{7} \times \frac{21}{24} = \frac{1}{2}$

R  $\frac{9}{22} \times 11 = \frac{9}{2}$

C  $\frac{16}{35} \times \frac{25}{24} = \frac{10}{21}$

K  $\frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$

S  $\frac{18}{25} \times \frac{5}{6} = \frac{3}{5}$

D  $\frac{7}{10} \times \frac{5}{21} = \frac{1}{6}$

L  $\frac{27}{49} \times \frac{7}{9} = \frac{3}{7}$

T  $\frac{24}{30} \times \frac{6}{10} = \frac{12}{25}$

E  $\frac{4}{9} \times \frac{6}{12} = \frac{2}{9}$

M  $\frac{14}{28} \times \frac{4}{7} = \frac{2}{7}$

U  $\frac{16}{35} \times \frac{7}{8} = \frac{2}{5}$

F  $\frac{12}{24} \times \frac{8}{12} = \frac{1}{3}$

N  $\frac{13}{15} \times \frac{30}{39} = \frac{2}{3}$

V  $\frac{9}{12} \times \frac{4}{9} = \frac{1}{3}$

G  $\frac{15}{20} \times \frac{6}{12} = \frac{3}{8}$

O  $\frac{25}{50} \times \frac{10}{100} = \frac{1}{20}$

W  $\frac{3}{7} \times 14 = 6$

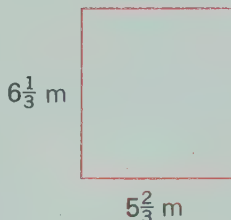
H  $\frac{5}{12} \times \frac{9}{25} = \frac{3}{20}$

P  $\frac{8}{10} \times \frac{12}{16} = \frac{3}{5}$

X  $\frac{14}{20} \times \frac{10}{18} = \frac{7}{18}$

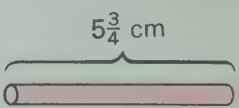
1. Jane wanted to cut a ribbon into 5 pieces, each  $3\frac{2}{5}$  cm long. How long a ribbon must she have to start with? 17 cm

2. To find the area of a rectangle, you must multiply length times width. What is the area of this rectangle?  $35\frac{8}{9} m^2$

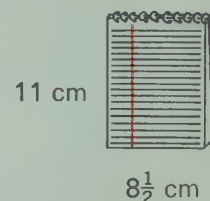


3. If flour costs  $7\frac{1}{2}$ ¢ per kg, what would be the cost of  $5\frac{3}{4}$  kg of flour?  $43\frac{1}{8}$ ¢

4. A floor tile costs  $11\frac{1}{4}$ ¢. What would 24 tiles cost? \$2.70

5. If 5 of these rods  $\rightarrow$   and  $\frac{1}{2}$  of another one were glued together end to end, how long would the resulting rod be?  $31\frac{5}{8} cm$

6. A piece of notebook paper is  $8\frac{1}{2}$  cm wide and 11 cm long.



- A What is the area of the paper?  $93\frac{1}{2} cm^2$
- B What is the perimeter of the paper? 39 cm

## CHANGE OF PACE

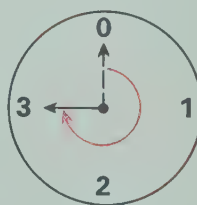
A special one-handed clock can be used to find sums and products in a system of arithmetic called **modulo 4**.

1. The example will help you complete the addition table.
2. Use repeated addition to complete the multiplication table.
3. Use the tables to help you solve the equations.

S A A P F F

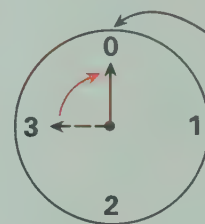
A  $0 - 3 = \boxed{1}$  B  $2 \div 3 = \boxed{2}$

Move 3 spaces



3

Then move 1 space



Ending number

3 + 1 = 0

+	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

×	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	0	2
3	0	3	2	1



1. Sometimes you can find the quotient of two fractional numbers by finding the missing factors.

P      F      F

$$\frac{8}{9} \div \frac{2}{3} = ?$$



Think:

"What fractional number times  $\frac{2}{3}$  gives  $\frac{8}{9}$ ?"

F      F      P

$$? \times \frac{2}{3} = \frac{8}{9}$$

A What is the missing factor?  $\frac{4}{3} \times \frac{2}{3} = \frac{8}{9}$

B What is the quotient?  $\frac{8}{9} \div \frac{2}{3} = \frac{4}{3}$

2. Find the quotients.

?  $\times \frac{3}{4} = \frac{15}{16}$

A  $\frac{15}{16} \div \frac{3}{4} = \frac{5}{4}$

?  $\times \frac{3}{2} = \frac{9}{10}$

B  $\frac{9}{10} \div \frac{3}{2} = \frac{3}{5}$

?  $\times \frac{1}{4} = \frac{3}{4}$

C  $\frac{3}{4} \div \frac{1}{4} = 3$

D  $\frac{2}{15} \div \frac{2}{3} = \frac{1}{5}$

E  $\frac{5}{4} \div \frac{1}{2} = \frac{5}{2}$

F  $\frac{7}{15} \div \frac{1}{3} = \frac{7}{5}$

G  $\frac{3}{4} \div \frac{1}{2} = \frac{3}{2}$

H  $\frac{10}{14} \div \frac{5}{7} = 1$

I  $\frac{5}{6} \div \frac{1}{2} = \frac{5}{3}$

J  $\frac{10}{21} \div \frac{2}{7} = \frac{5}{3}$

K  $\frac{4}{5} \div 1 = \frac{4}{5}$

L  $\frac{0}{2} \div \frac{1}{2} = 0$

M  $\frac{12}{25} \div \frac{4}{5} = \frac{3}{5}$

N  $\frac{10}{3} \div \frac{5}{3} = 2$

O  $\frac{9}{9} \div \frac{1}{3} = 3$

P  $\frac{100}{9} \div \frac{20}{3} = \frac{5}{3}$

Q  $\frac{5}{12} \div \frac{5}{4} = \frac{1}{3}$

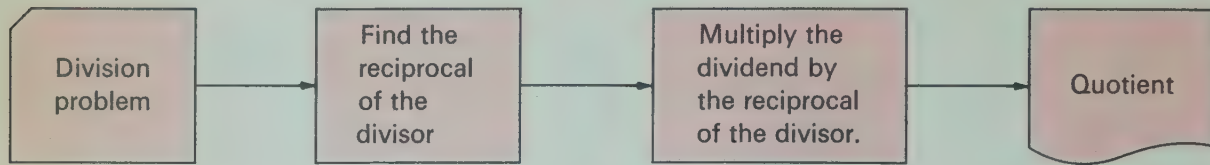
R  $\frac{10}{10} \div \frac{5}{5} = 1$

S  $\frac{27}{8} \div \frac{3}{4} = \frac{9}{2}$

T  $\frac{9}{16} \div \frac{3}{8} = \frac{3}{2}$

U  $\frac{24}{25} \div \frac{3}{5} = \frac{8}{5}$

1. Give the missing fraction for each  $\square$ . Then find the products and quotients. Follow the steps in the flow chart to help you divide fractional numbers.



$$\frac{3}{7} \div \frac{5}{8}$$

The reciprocal of  $\frac{5}{8}$  is  $\frac{8}{5}$ .

$$\frac{3}{7} \times \frac{8}{5} = \frac{24}{35}$$

$$\frac{3}{7} \div \frac{5}{8} = \frac{24}{35}$$

A  $\frac{3}{5} \div \frac{2}{3}$

The reciprocal of  $\frac{2}{3}$  is  $\frac{3}{2}$ .

$$\frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$$

$$\frac{3}{5} \div \frac{2}{3} = \frac{9}{10}$$

B  $\frac{2}{7} \div \frac{4}{9}$

The reciprocal of  $\frac{4}{9}$  is  $\frac{9}{4}$ .

$$\frac{2}{7} \times \frac{9}{4} = \frac{9}{14}$$

$$\frac{2}{7} \div \frac{4}{9} = \frac{9}{14}$$

C  $6 \div \frac{2}{5}$

The reciprocal of  $\frac{2}{5}$  is  $\frac{5}{2}$ .

$$6 \times \frac{5}{2} = 15$$

$$6 \div \frac{2}{5} = 15$$

2. Write each division problem as a multiplication problem. Then find the quotients.

A  $\frac{6}{7} \div \frac{2}{3} = \frac{6}{7} \times \frac{3}{2} = 1\frac{12}{7}$

E  $10 \div \frac{1}{2} = \frac{10}{1} \times \frac{2}{1} = 20$

B  $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1} = 1\frac{1}{2}$

F  $\frac{3}{7} \div 3 = \frac{3}{7} \times \frac{1}{3} = \frac{1}{7}$

C  $\frac{2}{5} \div \frac{1}{4} = \frac{2}{5} \times \frac{4}{1} = 1\frac{3}{5}$

G  $\frac{3}{5} \div \frac{2}{3} = \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$

D  $\frac{5}{9} \div \frac{1}{2} = \frac{5}{9} \times \frac{2}{1} = 1\frac{1}{9}$

H  $\frac{5}{18} \div \frac{5}{18} = \frac{5}{18} \times \frac{18}{5} = 1$

3. Find the quotients.

A  $\frac{3}{4} \div \frac{5}{6} = \frac{9}{10}$

C  $\frac{2}{3} \div 8 = \frac{1}{12}$

E  $4 \div \frac{2}{3} = 6$

B  $\frac{1}{2} \div 6 = \frac{1}{12}$

D  $\frac{6}{7} \div \frac{1}{2} = 1\frac{5}{7}$

F  $\frac{9}{10} \div 5 = \frac{9}{50}$

1. Write the correct fraction in each  . Then write a mixed numeral or lowest-terms fraction in the   for the quotient.

A  $2\frac{1}{4} \div 1\frac{1}{2}$

↓      ↓

$$\frac{9}{4} \div \frac{3}{2} = \frac{9}{4} \times \frac{2}{3} = 1\frac{1}{2}$$

B  $\frac{5}{8} \div 1\frac{1}{3}$

↓      ↓

$$\frac{5}{8} \div \frac{4}{3} = \frac{5}{8} \times \frac{3}{4} = \frac{15}{32}$$

C  $1\frac{1}{4} \div \frac{1}{5}$

↓      ↓

$$\frac{5}{4} \div \frac{1}{5} = \frac{5}{4} \times \frac{5}{1} = 6\frac{1}{4}$$

D  $4\frac{1}{2} \div \frac{2}{3}$

↓      ↓

$$\frac{9}{2} \div \frac{2}{3} = \frac{9}{2} \times \frac{3}{2} = 6\frac{3}{4}$$

2. Simplify each expression as in the example.

Example:  $\frac{\frac{1}{4}}{\frac{2}{3}} = \frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$

B  $\frac{\frac{5}{6}}{\frac{1}{4}} = \frac{5}{6} \div \frac{1}{4} = \frac{5}{6} \times \frac{4}{1} = 3\frac{1}{3}$

A  $\frac{\frac{3}{5}}{\frac{1}{2}} = \frac{3}{5} \div \frac{1}{2} = \frac{3}{5} \times \frac{2}{1} = 1\frac{1}{5}$

C  $\frac{\frac{7}{10}}{\frac{1}{3}} = \frac{7}{10} \div \frac{1}{3} = \frac{7}{10} \times \frac{3}{1} = 2\frac{1}{10}$

3. Find the quotients. Use mixed numerals in your answers.

A  $4 \overline{) 9\frac{1}{4} 37}$

B  $7 \overline{) 9\frac{5}{7} 68}$

C  $6 \overline{) 8\frac{1}{3} 50}$

D  $12 \overline{) 4\frac{1}{6} 94}$

4. Find the quotients.

A  $6\frac{1}{3} \div 2\frac{1}{2} = 2\frac{8}{15}$

B  $17\frac{1}{2} \div 3\frac{3}{4} = 4\frac{2}{3}$

C  $\frac{\frac{9}{10}}{\frac{5}{8}} = 1\frac{11}{25}$

D  $8 \overline{) 235} = 29\frac{3}{8}$

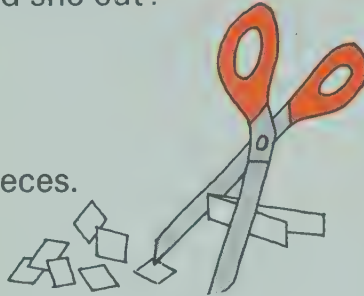


For each exercise, write a division equation. Then solve it to complete the sentence.

1. Joan had 8 cm of ribbon. She cut it into pieces each  $\frac{2}{3}$  of a cm long. How many pieces did she cut?

$$8 \div \frac{2}{3} = n$$

There were 12 pieces.



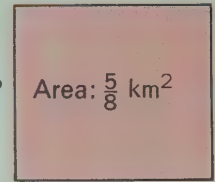
5. A field has area  $\frac{5}{8} \text{ km}^2$  and length  $\frac{5}{6} \text{ km}$ . What is the width of the field?

Length:  $\frac{5}{6} \text{ km}$

? Area:  $\frac{5}{8} \text{ km}^2$

$$\frac{5}{8} \div \frac{5}{6} = n$$

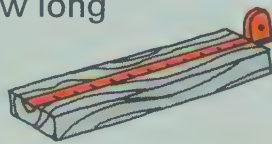
The field is  $\frac{3}{4}$  km wide.



2. A carpenter had a board  $5\frac{1}{2} \text{ m}$  long. He cut it into 3 pieces, each the same length. How long was each piece?

$$5\frac{1}{2} \div 3 = n$$

Each piece was  $1\frac{5}{6}$  metres long.



6. A book is  $1\frac{1}{4} \text{ cm}$  thick. How many of these books can be placed on a bookshelf 10 cm wide?

$$10 \div 1\frac{1}{4} = n$$

8 books can be placed on the shelf.



3. If a barber can complete a haircut in  $\frac{1}{4}$  hour, how many haircuts can he complete in  $4\frac{1}{2}$  hours?

$$4\frac{1}{2} \div \frac{1}{4} = n$$

He can complete 18 haircuts.

7. 96 litres of oil are pumped into a tank at the rate of 7 litres per second. How many seconds does it take to pump all the oil into the tank?

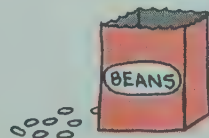
$$96 \div 7 = n$$

It takes  $13\frac{5}{7}$  seconds to pump the oil.

4. 56 kg of beans were put into 9 sacks. Each sack of beans weighed the same. What did each sack weigh?

$$56 \div 9 = n$$

Each sack weighed  $6\frac{2}{9}$  kg.



8. David walks 2 kilometres each hour. How long will it take him to walk  $5\frac{1}{3}$  kilometres?

$$5\frac{1}{3} \div 2 = n$$

At this rate, it would take David exactly  $2\frac{2}{3}$  hours.

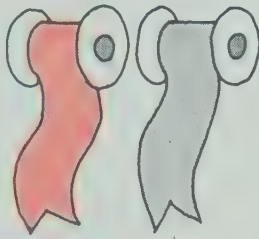
Ring the best estimate for each problem. Do as little calculating as possible.

1. One full box weighs  $99\frac{3}{4}$  kg.  
Another weighs  $50\frac{1}{5}$  kg.  
What is the total weight of both boxes together?

A 149 kg      B 151 kg  
C 150 kg

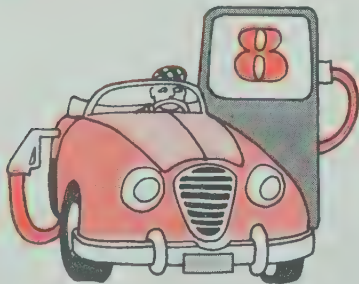
2. The red ribbon was  $34\frac{3}{20}$  cm long.  
The blue ribbon was  $21\frac{9}{10}$  cm long.  
How much longer was the red ribbon?

A 10 cm  
B 12 cm  
C 13 cm



3. One litre of gasoline costs  $16\frac{9}{10}$  ¢.  
What is the cost of 10 litres?

A \$1.60      B \$1.70      C \$17.00



4. A man drove 200 km in  $4\frac{1}{4}$  hours.  
What was his average speed in kilometres per hour?

A 50      B 40      C 60

5. A can contains  $16\frac{3}{4}$  g of fish and costs 48¢. How much does the fish cost per gram?

A 3¢      B 4¢      C 5¢

6. A container of water weighs 60 litre.  
If a litre of water weighs 1 kilogram  
how many kilograms of water  
are in  $4\frac{1}{2}$  containers?

A 250 l      B 50 l      C 270 l

7. A garden is  $29\frac{2}{5}$  m wide and  
 $80\frac{1}{4}$  m long. What is the  
area of the garden?

A 2000 m<sup>2</sup>      B 2800 m<sup>2</sup>  
C 2400 m<sup>2</sup>

8. A paper clip is about  $2\frac{1}{2}$  centimetres long.  
How many centimetres long is a string  
of 15 paper clips?

A 32 cm      B 38 cm      C 30 cm



9. It takes about  $2\frac{3}{4}$  hours to drive from  
town A to town B and back. Mr. Jones  
makes the drive 6 times a week.  
How many hours does he spend driving?

A 18 hours      B 35 hours  
C 20 hours

1. Find the products.

A  $\frac{1}{3} \times \frac{1}{4} = \underline{\frac{1}{12}}$     B  $\frac{1}{2} \times \frac{5}{6} = \underline{\frac{5}{12}}$     C  $5 \times \frac{1}{2} = \underline{2\frac{1}{2}}$     D  $4 \times \frac{3}{8} = \underline{1\frac{1}{2}}$   
 E  $\frac{4}{5} \times \frac{1}{4} = \underline{\frac{1}{5}}$     F  $\frac{2}{3} \times \frac{9}{10} = \underline{\frac{3}{5}}$     G  $\frac{5}{8} \times 1\frac{1}{3} = \underline{\frac{5}{6}}$     H  $1\frac{2}{5} \times 8\frac{3}{4} = \underline{16\frac{1}{4}}$

2. Find the quotients.

A  $\frac{2}{5} \div \frac{3}{4} = \underline{\frac{8}{15}}$     B  $\frac{8}{9} \div 2 = \underline{\frac{4}{9}}$     C  $39 \div 7 = \underline{5\frac{4}{7}}$     D  $1\frac{7}{8} \div 1\frac{1}{2} = \underline{1\frac{1}{4}}$

3. Ring the best estimate.

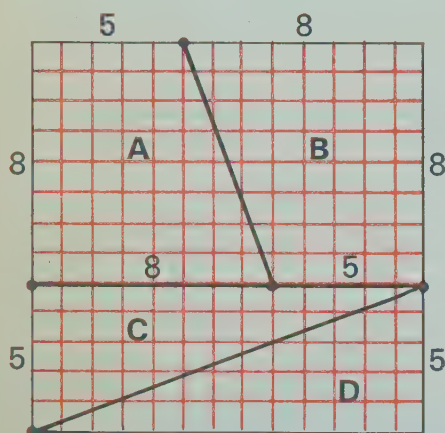
A  $1\frac{1}{3}$  m of corduroy to make a skirt. Costs 99¢ a metre.

How much did the corduroy cost? \$1.20, \$1.35, \$1.50

B 50 walnuts in a box. How many walnuts in  $6\frac{1}{4}$  boxes? 400, 300, 200

4. Find the exact answers for exercise 3.    3A: \$1.32    3B:  $312\frac{1}{2}$

## CHANGE OF PACE



1. A Each side of the square is 13 units long.

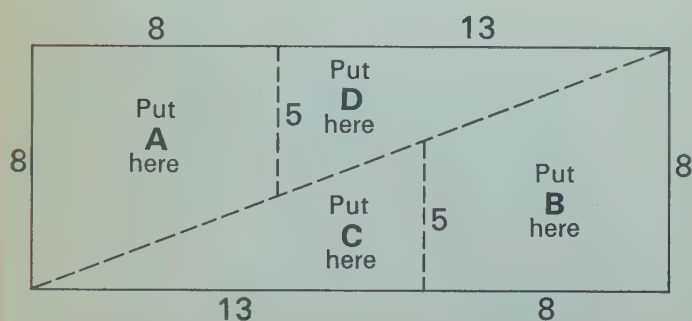
B The area of the square is 169 square units.

2. A It appears that pieces A, B, C, and D from the square will fit together to form the rectangle below with length 21 units and width 8 units.

B The area of the rectangle is 168 square units.

3. Can you explain why the area of the square is different from the area of the rectangle?

On a separate sheet of paper, trace a copy of the pieces of the square. Then cut out the pieces and paste them very carefully on the positions shown on the rectangle. Now can you explain?

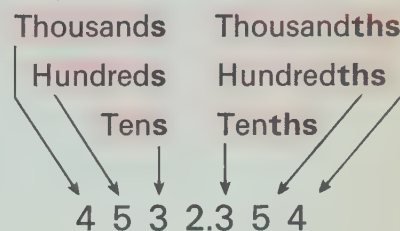


*After following the tracing, cutting, and pasting procedure, it can be seen that the pieces do not form a straight line along the diagonal of the rectangle.*



1. Certain fractional numbers can be represented using **decimals**.  
Give the missing numbers.

- A The 3 in the tens place means  $3 \times \underline{10}$ .
- B The 3 in the tenths place means  $3 \times \underline{\frac{1}{10}}$ .
- C The 5 in the hundreds place means  $5 \times \underline{100}$ .
- D The 5 in the hundredths place means  $5 \times \underline{\frac{1}{100}}$ .
- E The 4 in the thousands place means  $4 \times \underline{1000}$ .
- F The 4 in the thousandths place means  $4 \times \underline{\frac{1}{1000}}$ .



2. Give the missing words and numbers.

- A 8.04: The 4 in the hundredths place means  $\frac{4}{100}$ .
- B 19.6: The 6 in the tenths place means  $\frac{6}{10}$ .
- C 2.018: The 8 in the thousandths place means  $\frac{8}{1000}$ .
- D 56.234: The 3 in the hundredths place means  $\frac{3}{100}$ .
- E 78.254: The 4 in the thousandths place means  $\frac{4}{1000}$ .

3. Write each decimal as shown in the examples.

A  $36.42 = \underline{36} + \underline{\frac{4}{10}} + \underline{\frac{2}{100}}$

D  $0.923 = \underline{\frac{9}{10}} + \underline{\frac{2}{100}} + \underline{\frac{3}{1000}}$

B  $8.07 = \underline{8} + \underline{\frac{0}{10}} + \underline{\frac{7}{100}}$

E  $4.23 = \underline{4} + \underline{\frac{2}{10}} + \underline{\frac{3}{100}}$

C  $54.309 = \underline{54} + \underline{\frac{3}{10}} + \underline{\frac{0}{100}} + \underline{\frac{9}{1000}}$

F  $61.3 = \underline{60} + \underline{1} + \underline{\frac{3}{10}}$

4. Write the correct decimal for each sum.

A  $25 + \frac{9}{10} = \underline{25.9}$

D  $49 + \frac{1}{10} + \frac{7}{100} + \frac{5}{1000} = \underline{49.175}$

B  $7 + \frac{3}{10} + \frac{4}{100} = \underline{7.34}$

E  $11 + \frac{7}{10} + \frac{9}{1000} = \underline{11.709}$

C  $9 + \frac{2}{10} + \frac{5}{100} + \frac{1}{1000} = \underline{9.251}$

F  $\frac{6}{10} + \frac{3}{100} + \frac{8}{1000} = \underline{.638}$

1. Write the correct numeral in each

Then write the correct mixed numeral in the blank.

$$A \quad 3.54 = 3 + \frac{5}{10} + \frac{4}{100} = 3 + \frac{50}{100} + \frac{4}{100} = \underline{3\frac{54}{100}}$$

$$B \quad 7.92 = 7 + \frac{9}{10} + \frac{2}{100} = 7 + \frac{90}{100} + \frac{2}{100} = \underline{7\frac{92}{100}}$$

$$C \quad 6.375 = 6 + \frac{3}{10} + \frac{7}{100} + \frac{5}{1000} = 6 + \frac{300}{1000} + \frac{70}{1000} + \frac{5}{1000} = \underline{6\frac{375}{1000}}$$

$$D \quad 9.464 = 9 + \frac{4}{10} + \frac{6}{100} + \frac{4}{1000} = 9 + \frac{400}{1000} + \frac{60}{1000} + \frac{4}{1000} = \underline{9\frac{464}{1000}}$$

$$E \quad 5.806 = 5 + \frac{8}{10} + \frac{0}{100} + \frac{6}{1000} = 5 + \frac{800}{1000} + \frac{0}{1000} + \frac{6}{1000} = \underline{5\frac{806}{1000}}$$

$$F \quad 8.230 = 8 + \frac{2}{10} + \frac{3}{100} + \frac{0}{1000} = 8 + \frac{200}{1000} + \frac{30}{1000} + \frac{0}{1000} = \underline{8\frac{230}{1000}}$$

2. Write the correct numeral in each. Then write the correct decimal in the blank.

$$A \quad 6\frac{34}{100} = 6 + \frac{30}{100} + \frac{4}{100} = 6 + \frac{3}{10} + \frac{4}{100} = \underline{6.34}$$

$$B \quad 3\frac{28}{100} = 3 + \frac{20}{100} + \frac{8}{100} = 3 + \frac{2}{10} + \frac{8}{100} = \underline{3.28}$$

$$C \quad \frac{431}{100} = \frac{400}{100} + \frac{30}{100} + \frac{1}{100} = 4 + \frac{3}{10} + \frac{1}{100} = \underline{4.31}$$

$$D \quad 9\frac{506}{1000} = 9 + \frac{500}{1000} + \frac{0}{1000} + \frac{6}{1000} = 9 + \frac{5}{10} + \frac{0}{100} + \frac{6}{1000} = \underline{9.506}$$

$$E \quad 4\frac{712}{1000} = 4 + \frac{700}{1000} + \frac{10}{1000} + \frac{2}{1000} = 4 + \frac{7}{10} + \frac{1}{100} + \frac{2}{1000} = \underline{4.712}$$

$$F \quad \frac{6873}{1000} = \frac{6000}{1000} + \frac{800}{1000} + \frac{70}{1000} + \frac{3}{1000} = 6 + \frac{8}{10} + \frac{7}{100} + \frac{3}{1000} = \underline{6.873}$$

3. Write the correct decimal or mixed numeral.

$$A \quad 7.3 = \underline{7\frac{3}{10}}$$

$$E \quad 9.402 = \underline{9\frac{402}{1000}}$$

$$I \quad \underline{6.004} = 6\frac{4}{1000}$$

$$B \quad 8\frac{2}{10} = \underline{8.2}$$

$$F \quad 3\frac{225}{1000} = \underline{3.225}$$

$$J \quad 2.036 = \underline{2\frac{36}{1000}}$$

$$C \quad 6.25 = \underline{6\frac{25}{100}}$$

$$G \quad \underline{53.27} = 53\frac{27}{100}$$

$$K \quad 3\frac{27}{1000} = \underline{3.027}$$

$$D \quad 4\frac{36}{100} = \underline{4.36}$$

$$H \quad \underline{8\frac{5}{100}} = 8.05$$

$$L \quad \underline{5\frac{2}{1000}} = 5.002$$

1. Give the missing words **tenths**, **hundredths**, **thousandths**, **less**, or **greater**.  
Give the correct sign ( $<$  or  $>$ ) in each

A 5.632 and 5.732 differ in the number of tenths.

5.632 is less than 5.732. We write  $5.632 < 5.732$ .

B 3.854 and 3.834 differ in the number of hundredths.

3.854 is greater than 3.834. We write  $3.854 > 3.834$ .

2. Give the correct sign ( $<$  or  $>$ ) for each

A  $0.1 < 1$

G  $0.01 > 0.009$

M  $36.09 < 37.01$

B  $0.1 > 0.01$

H  $0.1 > 0.009$

N  $53.029 < 53.092$

C  $0.01 > 0.001$

I  $1.001 > 0.999$

O  $0.609 < 0.690$

D  $0.001 < 0.1$

J  $3.099 < 3.1$

P  $0.769 > 0.696$

E  $0.1 > 0.09$

K  $3.999 < 4$

Q  $4.051 < 4.053$

F  $0.3 > 0.08$

L  $54.9 < 55.1$

R  $0.045 < 0.046$

3. Give the number that is **one tenth** less than:

A 0.9 0.8

B 1.1 1

C 1 0.9

D 4.93 4.83

4. Give the number that is **one hundredth** less than:

A 0.09 0.08

B 1.01 1

C 1 0.99

D 3.5 3.49

5. Give the number that is **one thousandth** less than:

A 0.369 0.368

B 5.001 5

C 5 4.999

D 4.5 4.499

6. Give the correct sign ( $<$ ,  $=$ , or  $>$ ) for each

A  $63.07 < 63 + \frac{7}{10}$

D  $5.039 < 5 + \frac{3}{10} + \frac{9}{1000}$

G  $1.2 > \frac{2}{10} + \frac{1}{100}$

B  $7.56 < 7 + \frac{5}{10} + \frac{6}{100}$

E  $8.027 < 8 + \frac{7}{100} + \frac{2}{10}$

H  $0.769 < \frac{7}{1000} + \frac{6}{100} + \frac{9}{10}$

C  $0.609 < \frac{6}{10} + \frac{9}{100}$

F  $0.990 > \frac{0}{10} + \frac{9}{100} + \frac{9}{1000}$

I  $0.303 < \frac{3}{1000} + \frac{0}{100} + \frac{3}{10}$



1. Adding and subtracting **tenths**, **hundredths**, and **thousandths** is very much like adding and subtracting **tens**, **hundreds**, and **thousands**. Find the sums and differences.

$$\begin{array}{r} \text{A} \quad 0.39 \\ + 0.15 \\ \hline 0.54 \end{array}$$

$$\begin{array}{r} \text{B} \quad 3.07 \\ + 4.26 \\ \hline 7.33 \end{array}$$

$$\begin{array}{r} \text{C} \quad 4.98 \\ + 7.2 \\ \hline 12.18 \end{array}$$

$$\begin{array}{r} \text{D} \quad 54.20 \\ + 16.99 \\ \hline 71.19 \end{array}$$

$$\begin{array}{r} \text{E} \quad 0.046 \\ + 0.238 \\ \hline 0.284 \end{array}$$

$$\begin{array}{r} \text{F} \quad 39.2 \\ + 14.83 \\ \hline 54.03 \end{array}$$

$$\begin{array}{r} \text{G} \quad 0.73 \\ - 0.48 \\ \hline 0.25 \end{array}$$

$$\begin{array}{r} \text{H} \quad 0.926 \\ - 0.189 \\ \hline 0.737 \end{array}$$

$$\begin{array}{r} \text{I} \quad 6.05 \\ - 2.47 \\ \hline 3.58 \end{array}$$

$$\begin{array}{r} \text{J} \quad 85.4 \\ - 9.23 \\ \hline 76.17 \end{array}$$

$$\begin{array}{r} \text{K} \quad 350.3 \\ - 113.9 \\ \hline 236.4 \end{array}$$

$$\begin{array}{r} \text{L} \quad 824.16 \\ - 92.38 \\ \hline 731.78 \end{array}$$

$$\begin{array}{r} \text{M} \quad 700.5 \\ + 296.5 \\ \hline 997.0 \end{array}$$

$$\begin{array}{r} \text{N} \quad 96.28 \\ + 63.37 \\ \hline 159.65 \end{array}$$

$$\begin{array}{r} \text{O} \quad 96.28 \\ - 63.37 \\ \hline 32.91 \end{array}$$

$$\begin{array}{r} \text{P} \quad 54.20 \\ - 16.99 \\ \hline 37.21 \end{array}$$

$$\begin{array}{r} \text{Q} \quad 99.95 \\ + 32.06 \\ \hline 132.01 \end{array}$$

$$\begin{array}{r} \text{R} \quad 4.256 \\ - 3.89 \\ \hline 0.366 \end{array}$$

$$\begin{array}{r} \text{S} \quad 60.5 \\ + 29.3 \\ \hline 89.8 \end{array}$$

$$\begin{array}{r} \text{T} \quad 3.42 \\ + 25.1 \\ \hline 28.52 \end{array}$$

2. Write these problems vertically in the space provided below and find the sums.

A  $8.6 + 3.46 + 59.4 + 0.365$

D  $0.039 + 0.549 + 0.207$

B  $5.49 + 2.3 + 0.067 + 0.189$

E  $28.9 + 63.27 + 19.358$

C  $23.18 + 49.8 + 16.3 + 2.14$

F  $4.06 + 9.97 + 12.459$

$$\begin{array}{r} \text{A} \quad 8.6 \\ 3.46 \\ 59.4 \\ + 0.365 \\ \hline 71.825 \end{array}$$

$$\begin{array}{r} \text{B} \quad 5.49 \\ 2.3 \\ 0.067 \\ + 0.189 \\ \hline 8.046 \end{array}$$

$$\begin{array}{r} \text{C} \quad 23.18 \\ 49.8 \\ 16.3 \\ + 2.14 \\ \hline 91.42 \end{array}$$

$$\begin{array}{r} \text{D} \quad 0.039 \\ 0.549 \\ 0.207 \\ \hline 0.795 \end{array}$$

$$\begin{array}{r} \text{E} \quad 28.9 \\ 63.27 \\ 19.358 \\ \hline 111.528 \end{array}$$

$$\begin{array}{r} \text{F} \quad 4.06 \\ 9.97 \\ 12.459 \\ \hline 26.489 \end{array}$$

3. Solve each story problem.

- A Mr. Holten bought the following amounts of gasoline during one week:

Monday 9.6 litres  
Tuesday 12.4 litres  
Wednesday 7.8 litres  
Thursday 13.6 litres

How many litres did he buy in all? 43.4 litres

- B Mr. Donner recorded these odometer readings each day of his trip:

Monday 5325.6  
Tuesday 5719.8  
Wednesday 6358.7  
Thursday 7198.8

What was the greatest distance he travelled between readings? 840.1 km

1. Ring the correct fraction and decimal for each part.

A  $\frac{53}{100}$  is nearer to:  $\frac{50}{100}$ ,  $\frac{60}{100}$

0.53 rounded to the nearest **tenth** is: 0.5, 0.6

B  $\frac{236}{1000}$  is nearer to:  $\frac{230}{1000}$ ,  $\frac{240}{1000}$

0.236 rounded to the nearest **hundredth** is: 0.23, 0.24

C  $\frac{4637}{10000}$  is nearer to:  $\frac{4000}{10000}$ ,  $\frac{5000}{10000}$

0.4637 rounded to the nearest **tenth** is: 0.4, 0.5

D  $\frac{55683}{100000}$  is nearer to:  $\frac{55600}{100000}$ ,  $\frac{55700}{100000}$

0.55683 rounded to the nearest **thousandth** is: 0.556, 0.557

E  $\frac{47652}{100000}$  is nearer to:  $\frac{47000}{100000}$ ,  $\frac{48000}{100000}$

0.47652 rounded to the nearest **hundredth** is: 0.47, 0.48

F  $\frac{846391}{1000000}$  is nearer to:  $\frac{800000}{1000000}$ ,  $\frac{900000}{1000000}$

0.846391 rounded to the nearest **tenth** is: 0.8, 0.9

2. Ring the correct decimal.

A 0.236 is nearer to: 0.23, 0.24

B 0.2364 is nearer to: 0.236, 0.237

C 0.2364 rounded to the nearest hundredth is: 0.23, 0.24

3. Round each number to the nearest **tenth**.

A 0.67 0.7

B 8.357 8.4

C 0.4638 0.5

D 2.53694 2.5

4. Round each number to the nearest **hundredth**.

A 0.496 0.50

C 0.8765496 0.88

E 0.8356 0.84

B 0.537642 0.54

D 5.635 5.64

F 3.809 3.81

5. Round each number to the nearest **thousandth**.

A 5.4696 5.470

B 0.843596 0.844

C 7.6834975 7.683

1. Find the product of the numbers in the cloud. Then give the product of the same numbers, using decimals, in the   .

<p><b>A</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>10 \times \frac{1}{10} = \frac{10}{10}</math> </span>  <math>10 \times .1 = 1.0 \text{ or } 1</math></p>	<p><b>B</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>10 \times \frac{1}{100} = \frac{10}{100}</math> </span>  <math>10 \times .01 = .1</math></p>	<p><b>C</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>100 \times \frac{1}{10} = \frac{100}{10}</math> </span>  <math>100 \times .1 = 10</math></p>
<p><b>D</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>100 \times \frac{1}{100} = \frac{100}{100}</math> </span>  <math>100 \times .01 = 1.0 \text{ or } 1</math></p>	<p><b>E</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>\frac{4}{10} \times \frac{6}{10} = \frac{24}{100}</math> </span>  <math>.4 \times .6 = 0.24</math></p>	<p><b>F</b> <span style="border: 1px solid red; border-radius: 50%; padding: 10px; display: inline-block;"> <math>\frac{9}{10} \times \frac{46}{100} = \frac{414}{1000}</math> </span>  <math>.9 \times .46 = 0.414</math></p>

2. Find the products.

<p><b>A</b> <math>10 \times 3 = \underline{30}</math>  <math>10 \times .9 = \underline{9}</math></p>	<p>→</p>	<p><math>10 \times 3.9 = \underline{39}</math></p>
<p><b>B</b> <math>10 \times 4 = \underline{40}</math>  <math>10 \times .05 = \underline{0.5}</math></p>	<p>→</p>	<p><math>10 \times 4.05 = \underline{40.5}</math></p>
<p><b>C</b> <math>100 \times 5 = \underline{500}</math>  <math>100 \times .1 = \underline{10}</math></p>	<p>→</p>	<p><math>100 \times 5.1 = \underline{510}</math></p>
<p><b>D</b> <math>100 \times .8 = \underline{80}</math>  <math>100 \times .03 = \underline{3}</math></p>	<p>→</p>	<p><math>100 \times .83 = \underline{83}</math></p>

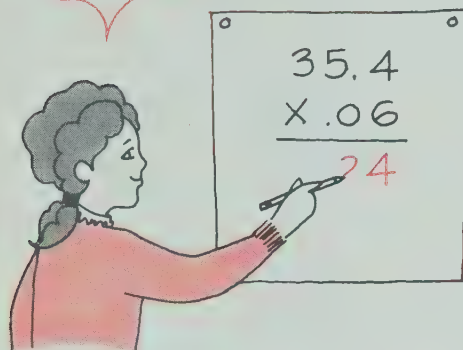
3. Find the products.

<b>A</b> $10 \times .7 = \underline{7}$	<b>B</b> $100 \times .18 = \underline{18}$	<b>C</b> $10 \times 9.8 = \underline{98}$
<b>D</b> $10 \times .14 = \underline{1.4}$	<b>E</b> $10 \times 35.02 = \underline{350.2}$	<b>F</b> $100 \times .07 = \underline{7}$
<b>G</b> $10 \times .563 = \underline{5.63}$	<b>H</b> $100 \times .465 = \underline{46.5}$	<b>I</b> $100 \times 54.48 = \underline{54.48}$
<b>J</b> $100 \times .002 = \underline{0.5}$	<b>K</b> $10 \times 61.3 = \underline{613}$	<b>L</b> $10 \times 3.09 = \underline{30.9}$
<b>M</b> $10 \times .1096 = \underline{1.096}$	<b>N</b> $100 \times 146.8 = \underline{14,680}$	<b>O</b> $100 \times .078 = \underline{7.8}$

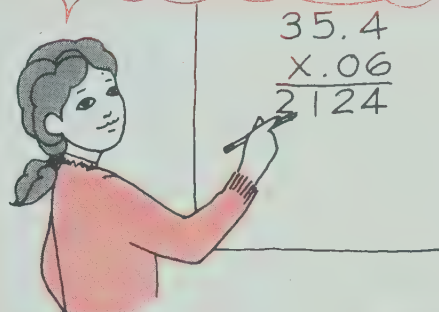


1. Complete the work in each cloud to show what the girl is thinking.  
Study the pictures to see how she does her work.

$$\begin{array}{r} 354 \\ \times 6 \\ \hline 2124 \end{array}$$



35.4 ← **tenths** (1-place decimal)  
times  
 $\times 0.06$  ← **hundredths** (2-place decimal)  
equals  
2.124 ← **thousandths** (3-place decimal)



2. Find the products. Use a fraction for each and a decimal for each.

A  $100 \times \frac{1}{100} = \frac{100}{100}$

$100 \times 0.01 = 1.0 \text{ or } 1$

B  $\frac{1}{10} \times \frac{1}{10} = \frac{1}{100}$

$0.1 \times 0.1 = 0.01$

C  $\frac{1}{10} \times \frac{1}{100} = \frac{1}{1000}$

$0.1 \times 0.01 = 0.001$

3. Find the products.

$$\begin{array}{r} 23.6 \\ \times 0.4 \\ \hline 9.44 \end{array}$$

B  $\begin{array}{r} 4.57 \\ \times 0.02 \\ \hline 0.0914 \end{array}$

C  $\begin{array}{r} 16.9 \\ \times 0.3 \\ \hline 5.07 \end{array}$

D  $\begin{array}{r} 49.8 \\ \times 0.7 \\ \hline 34.86 \end{array}$

E  $\begin{array}{r} 6.007 \\ \times 0.4 \\ \hline 2.4028 \end{array}$

F  $\begin{array}{r} 8.003 \\ \times 9 \\ \hline 72.027 \end{array}$

G  $\begin{array}{r} 25.4 \\ \times 0.6 \\ \hline 15.24 \end{array}$

H  $\begin{array}{r} 12.5 \\ \times 0.03 \\ \hline 0.375 \end{array}$

I  $\begin{array}{r} 27.2 \\ \times 0.005 \\ \hline 0.1360 \end{array}$

J  $\begin{array}{r} 38.5 \\ \times 0.4 \\ \hline 15.40 \end{array}$

K  $\begin{array}{r} 66.7 \\ \times 0.18 \\ \hline 5336 \\ 6670 \\ \hline 12.006 \end{array}$

L  $\begin{array}{r} 5.95 \\ \times 0.24 \\ \hline 2380 \\ 11900 \\ \hline 1.4280 \end{array}$

M  $\begin{array}{r} 200.6 \\ \times 0.39 \\ \hline 18054 \\ 60180 \\ \hline 78.234 \end{array}$

N  $\begin{array}{r} 7.76 \\ \times 0.25 \\ \hline 3880 \\ 15520 \\ \hline 1.9400 \end{array}$

O  $\begin{array}{r} 19.65 \\ \times 0.62 \\ \hline 3930 \\ 117900 \\ \hline 12.1830 \end{array}$

P  $\begin{array}{r} 947 \\ \times 0.64 \\ \hline 3788 \\ 56820 \\ \hline 606.08 \end{array}$

Q  $\begin{array}{r} 94.7 \\ \times 0.64 \\ \hline 3788 \\ 56820 \\ \hline 60.608 \end{array}$

R  $\begin{array}{r} 9.47 \\ \times 0.64 \\ \hline 3788 \\ 56820 \\ \hline 6.0608 \end{array}$

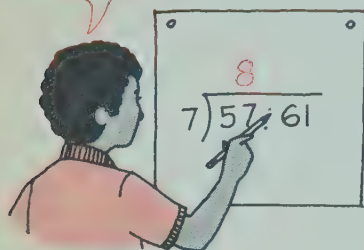
S  $\begin{array}{r} 865.7 \\ \times 0.23 \\ \hline 25971 \\ 173140 \\ \hline 199.111 \end{array}$

T  $\begin{array}{r} 965.4 \\ \times 0.098 \\ \hline 77232 \\ 868860 \\ \hline 94.6092 \end{array}$

1. Complete the work in each cloud to show what the boy is thinking.  
Study the pictures to see how he does his work.

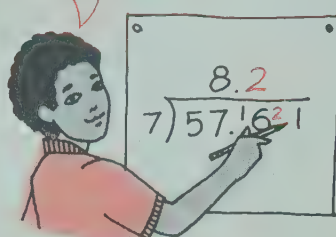
Dividing ones

$$\begin{array}{r} 8 \text{ r } 1 \\ 7 \overline{) 57} \end{array}$$



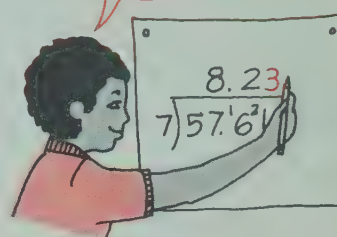
Dividing tenths

$$\begin{array}{r} 2 \text{ r } 2 \\ 7 \overline{) 16} \end{array}$$



Dividing hundredths

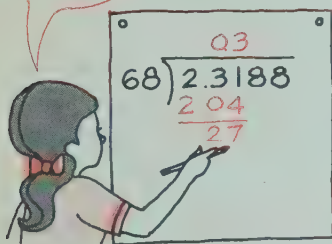
$$\begin{array}{r} 3 \text{ r } 0 \\ 7 \overline{) 21} \end{array}$$



2. Complete the work in the cloud to show what the girl is thinking.  
Study the pictures to see how she shows her work.

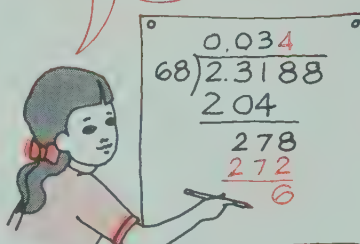
Dividing hundredths

$$\begin{array}{r} 3 \\ 68 \overline{) 231} \\ \underline{204} \\ 27 \end{array}$$



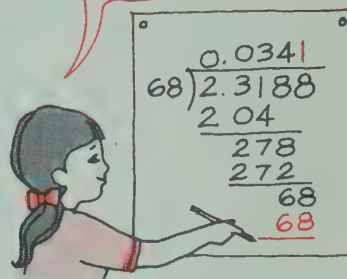
Dividing thousandths

$$\begin{array}{r} 4 \\ 68 \overline{) 278} \\ \underline{272} \\ 6 \end{array}$$



Dividing ten thousandths

$$\begin{array}{r} 1 \\ 68 \overline{) 68} \\ \underline{68} \end{array}$$



3. Find the quotients and check your work.

A  $\begin{array}{r} 7.21 \\ 6 \overline{) 43.26} \end{array}$  Check  $\begin{array}{r} 7.21 \\ \times 6 \\ \hline 43.26 \end{array}$

B  $\begin{array}{r} 9.81 \\ 3 \overline{) 29.43} \end{array}$  Check  $\begin{array}{r} 9.81 \\ \times 3 \\ \hline 29.43 \end{array}$

C  $\begin{array}{r} 0.639 \\ 9 \overline{) 5.751} \end{array}$  Check  $\begin{array}{r} 0.639 \\ \times 9 \\ \hline 5.751 \end{array}$

D  $\begin{array}{r} 20.5 \\ 21 \overline{) 430.5} \end{array}$  Check  $\begin{array}{r} 20.5 \\ \times 21 \\ \hline 205 \\ 4100 \\ \hline 430.5 \end{array}$

E  $\begin{array}{r} 0.0111 \\ 57 \overline{) 0.6327} \end{array}$  Check  $\begin{array}{r} 0.0111 \\ \times 57 \\ \hline 777 \\ 5550 \\ \hline 0.6327 \end{array}$

F  $\begin{array}{r} 0.094 \\ 84 \overline{) 7.896} \end{array}$  Check  $\begin{array}{r} 0.094 \\ \times 84 \\ \hline 376 \\ 7520 \\ \hline 7.896 \end{array}$

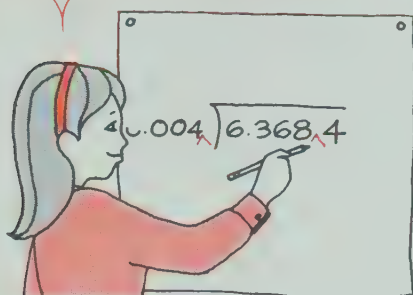
## ● Dividing a Decimal by a Decimal

1. When the divisor is a decimal, it is easier to find the quotient if we find a **division problem with a whole-number divisor that has the same answer**. Complete the work in the cloud to show what the girl is thinking. Then study the pictures to see how she shows her work.

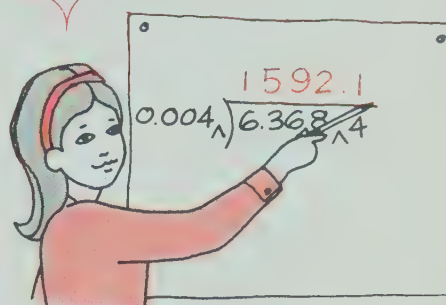
Multiply divisor and dividend by 1000.

$$1000 \times 0.004 = 4$$

$$1000 \times 6.3684 = 6368.4$$



$$\begin{array}{r} 1592.1 \\ 4 \overline{) 6368.4} \end{array}$$



2. Find the quotients. Check your work.

**A** 
$$\begin{array}{r} 43.2 \\ 0.8 \overline{) 345.6} \end{array}$$
 **Check**  

$$\begin{array}{r} 43.2 \\ \times 0.8 \\ \hline 34.56 \end{array}$$

**B** 
$$\begin{array}{r} 92.3 \\ 0.06 \overline{) 5.538} \end{array}$$
 **Check**  

$$\begin{array}{r} 92.3 \\ \times 0.06 \\ \hline 5.538 \end{array}$$

**C** 
$$\begin{array}{r} 0.81 \\ 9.2 \overline{) 7.452} \end{array}$$
 **Check**  

$$\begin{array}{r} 0.81 \\ \times 9.2 \\ \hline 7.452 \end{array}$$

**D** 
$$\begin{array}{r} 275.4 \\ 0.003 \overline{) 0.8262} \end{array}$$
 **Check**  

$$\begin{array}{r} 275.4 \\ \times 0.003 \\ \hline 0.8262 \end{array}$$

**E** 
$$\begin{array}{r} 0.50 \\ 2.7 \overline{) 1.350} \end{array}$$
 **Check**  

$$\begin{array}{r} 0.50 \\ \times 2.7 \\ \hline 1.350 \end{array}$$

**F** 
$$\begin{array}{r} 2.7 \\ 5.8 \overline{) 15.66} \end{array}$$
 **Check**  

$$\begin{array}{r} 2.7 \\ \times 5.8 \\ \hline 15.66 \end{array}$$

**G** 
$$\begin{array}{r} 4.1 \\ 0.45 \overline{) 1.845} \end{array}$$
 **Check**  

$$\begin{array}{r} 4.1 \\ \times 0.45 \\ \hline 1.845 \end{array}$$

**H** 
$$\begin{array}{r} 49.1 \\ 0.007 \overline{) 0.3437} \end{array}$$
 **Check**  

$$\begin{array}{r} 49.1 \\ \times 0.007 \\ \hline 0.3437 \end{array}$$

**I** 
$$\begin{array}{r} 73.2 \\ 0.19 \overline{) 13.908} \end{array}$$
 **Check**  

$$\begin{array}{r} 73.2 \\ \times 0.19 \\ \hline 13.908 \end{array}$$



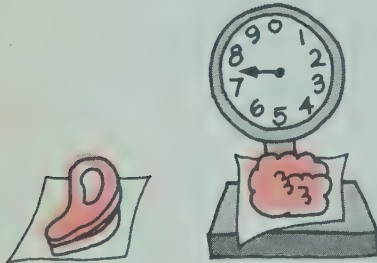
Write the correct answer in the blank.

1. A litre of milk weighs about 1.2 kg. A tank contains 81.6 kg of milk. How many litres of



milk does it contain? 68 litres

2. A housewife bought 7.5 kg of meat. The total cost was \$17.25. How much did the meat cost per kg? \$2.30



3. A paper clip is 2.54 centimetres long. How many paper clips long is a chain that is 12.7 centimetres long? 5

4. Nitrogen makes up 0.78 of each cubic metre of air. Oxygen makes up 0.21 of each cubic metre of air. A room is 12 m long, 9 m wide, and 7 m high.

- A How many cubic metres of air does the room contain? 756 m<sup>3</sup>
- B How many cubic metres of nitrogen does the room contain? 589.68 m<sup>3</sup>
- C How many cubic metres of oxygen does the room contain? 158.76 m<sup>3</sup>

5. If gasoline costs 18.2¢ per litre, what would 22.6 litres cost? \$ 411.32

6. 9 kg of potatoes cost \$1.05. What does 1 kg of potatoes cost (to the nearest tenth of a cent)? 11.7¢

7. A pitcher holds 1.05 litre. 9.4 litres are how many pitchers? 9.870

8. A metre is 100 centimetres.
- A Is a centimetre **more** or **less** than 0.0060524 m? More
- B Is a metre **more** or **less** than 98.7624 cm? More
- How much more or less? 1.2376

9. Ted and Jane were looking for a number that would multiply by itself and give 2 as the product.
- A Ted tried 1.4. What was the product? 1.96
- B Jane tried 1.5. What was the product? 2.25
- C What is the average of 1.4 and 1.5? 1.45
- D What is the product when the average of 1.4 and 1.5 is multiplied by itself? 2.1025

1. For each fraction, write an equivalent fraction with a denominator of 10, 100, or 1000. Then write a decimal for the fraction.

Example:  $\frac{9}{20} = \frac{9 \times 5}{20 \times 5} = \frac{45}{100} = 0.45$

A  $\frac{3}{5} = 0.6$

B  $\frac{7}{50} = 0.14$

C  $\frac{7}{20} = 0.35$

D  $\frac{3}{8} = 0.375$

2. Use division to a repeating decimal for each fraction. Carry out the dividing until you find a repeating block of digits.

A  $\frac{4}{9} = 0.\overline{4}$

B  $\frac{5}{12} = 0.4\overline{16}$

C  $\frac{8}{15} = 0.5\overline{3}$

D  $\frac{11}{6} = 1.8\overline{3}$

3. Carry out each division to the hundredths. Then write the quotient as a mixed-decimal numeral in **hundredths** as in the example.

Example:

$$\begin{array}{r} 0.57 \\ 7 \overline{) 4.00} \\ \underline{35} \phantom{0} \\ 50 \\ \underline{49} \\ 1 \end{array} \Rightarrow 0.57\frac{1}{7}$$

A  $8 \overline{) 7} = 0.87\frac{1}{2}$

B  $12 \overline{) 5} = 0.41\frac{2}{3}$

C  $45 \overline{) 31} = 0.68\frac{8}{9}$

4. Find the quotients. Round the answer as directed.

Example:

$$\begin{array}{r} 0.42 \\ \hline \end{array}$$

(Rounded to the nearest hundredth)

A  $\begin{array}{r} 0.4 \\ \hline \end{array}$   
(Rounded to the nearest tenth)

B  $\begin{array}{r} 0.586 \\ \hline \end{array}$   
(Rounded to the nearest thousandth)

C  $\begin{array}{r} 0.09 \\ \hline \end{array}$   
(Rounded to the nearest hundredth)

$$\begin{array}{r} 0.416 \\ 1.4 \overline{) 0.5830} \\ \underline{56} \phantom{0} \\ 23 \\ \underline{14} \phantom{0} \\ 90 \\ \underline{84} \\ 6 \end{array}$$

$$\begin{array}{r} 0.44 \\ 9 \overline{) 4.00} \\ \underline{36} \phantom{0} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

$$\begin{array}{r} 0.5857 \\ 0.8 \overline{) 0.46856} \\ \underline{40} \phantom{0} \\ 68 \\ \underline{64} \phantom{0} \\ 45 \\ \underline{40} \phantom{0} \\ 56 \\ \underline{56} \\ 0 \end{array}$$

$$\begin{array}{r} 0.086 \\ 2.3 \overline{) 0.1978} \\ \underline{184} \phantom{0} \\ 138 \\ \underline{138} \\ 0 \end{array}$$

1. Complete the sentences correctly for the number 0.3247

- A 4 in the thousandths place means  $4 \times \frac{1}{1000}$ .
- B 2 in the hundredths place means  $2 \times \frac{1}{100}$ .
- C 3 in the tenths place means  $3 \times \frac{1}{10}$ .
- D 7 in the ten thousandths place means  $7 \times \frac{1}{10\,000}$ .

2. Write a decimal or a mixed numeral. A  $4\frac{345}{1000} = \underline{4.345}$  B  $5.406 = \underline{5\frac{406}{1000}}$

3. Give the correct sign ( $<$ ,  $=$ , or  $>$ ) for each .

- A  $56.99 \img alt="red circle with a vertical line through it" data-bbox="160 338 190 362"/>  $57.09$  B  $0.1 \img alt="red circle with a vertical line through it" data-bbox="395 338 425 362"/>  $0.099$  C  $0.100 \img alt="red circle with a vertical line through it" data-bbox="645 338 675 362"/>  $0.10$  D  $0.99 \img alt="red circle with a vertical line through it" data-bbox="870 338 900 362"/>  $1.01$$$$$

4. Perform the indicated operation.

A 
$$\begin{array}{r} 26.95 \\ + 43.17 \\ \hline 70.12 \end{array}$$

B 
$$\begin{array}{r} 346.25 \\ - 129.37 \\ \hline 216.88 \end{array}$$

C 
$$\begin{array}{r} 4.75 \\ \times 0.6 \\ \hline 2.850 \end{array}$$

D 
$$\begin{array}{r} 87.7 \\ 0.5 \overline{) 43.85} \\ \underline{40} \phantom{00} \\ 38 \phantom{00} \\ \underline{35} \phantom{00} \\ 35 \phantom{00} \end{array}$$

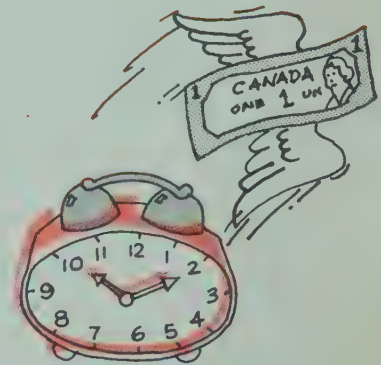
E 
$$\begin{array}{r} 0.095 \\ 7.8 \overline{) 0.7432} \\ \underline{702} \phantom{00} \\ 412 \phantom{00} \\ \underline{390} \phantom{00} \\ 22 \phantom{00} \end{array}$$

5. If an automobile will go 8.6 km while using one litre of gasoline, how far can it travel using 16.8 litres? 144.48 km

## CHANGE OF PACE

If you gave away \$1 each minute:

- How many dollars would you give away in a day? \$1440
- How many dollars would you give away in 100 days? \$144 000 1000 days? \$1 440 000
- About how many years would it take you to give away one million dollars? 2
- About how many years would it take you to give away one billion dollars? 2000
- If there are 200 million people in the United States and you divided one billion dollars equally among the people, how much would each person get? \$5



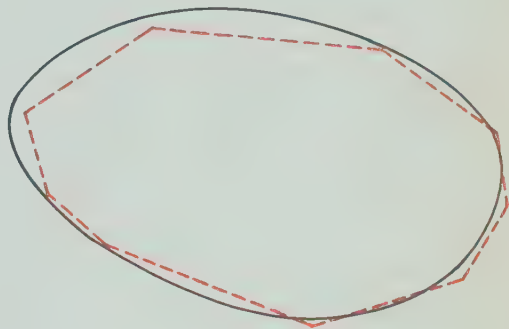


1. This string  can form this loop. 

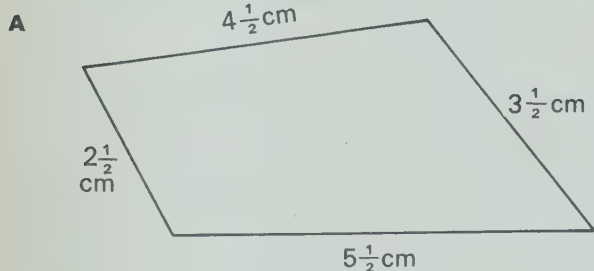
- A The **length** of the string is 6 centimetres.  
 B The **perimeter** of the loop is 6 centimetres.

2. Use a centimetre ruler to find the length of each dotted segment.

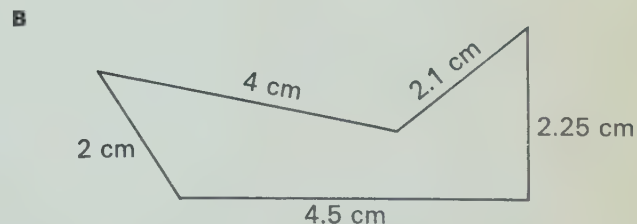
- A The sum of the lengths of all the segments is 16 centimetres.  
 B The estimated **perimeter** of the oval is about 16 centimetres.



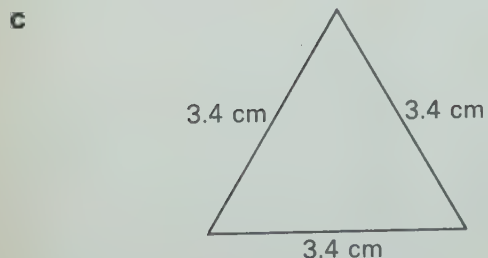
3. Find the perimeter of each polygon.



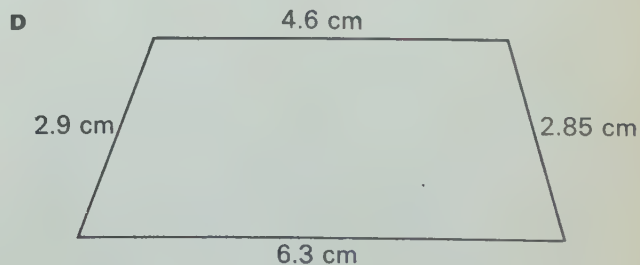
16 centimetres



14.85 centimetres



10.2 centimetres

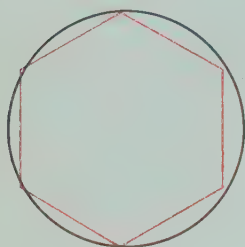


16.65 centimetres

For each exercise, use a centimetre ruler to find the perimeter of the polygon inscribed in the circle. Then use this measurement to help you estimate the circumference of the circle. Finally, use the formula given below to calculate the circumference of the circle. *Estimates may vary for parts A and B.*

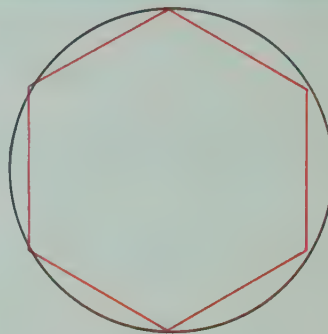
Circumference =  $\pi \times$  diameter, where  $\pi = 3.14$  (to the nearest hundredth).

1.



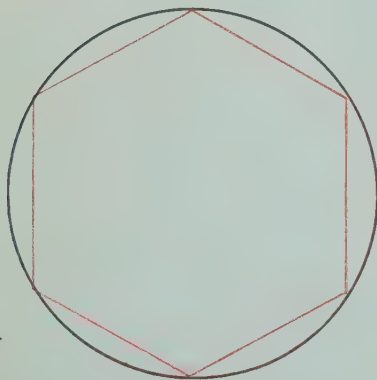
- A The estimated perimeter of the polygon is about 9 cm.
- B The estimated circumference of the circle is about 10 cm.
- C The calculated circumference of the circle is 9.42 cm.

2.



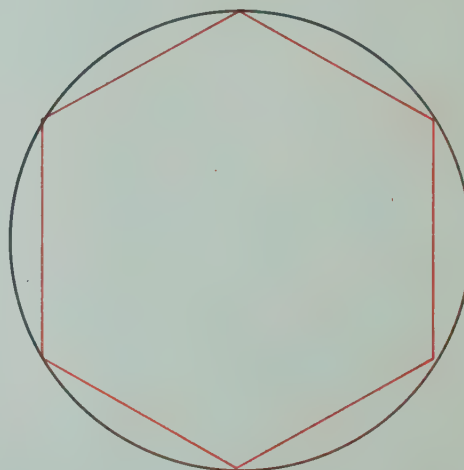
- A The estimated perimeter of the polygon is about 12 cm.
- B The estimated circumference of the circle is about 13 cm.
- C The calculated circumference of the circle is 12.56 cm.

3.



- A The estimated perimeter of the polygon is about 15 cm.
- B The estimated circumference of the circle is about 16 cm.
- C The calculated circumference of the circle is 15.7 cm.

4.



- A The estimated perimeter of the polygon is about 18 cm.
- B The estimated circumference of the circle is about 20 cm.
- C The calculated circumference of the circle is 18.84 cm.

1. We find the **area** of a rectangle by finding the number of square units it takes to "cover" the rectangle. Use the figures to complete the table.

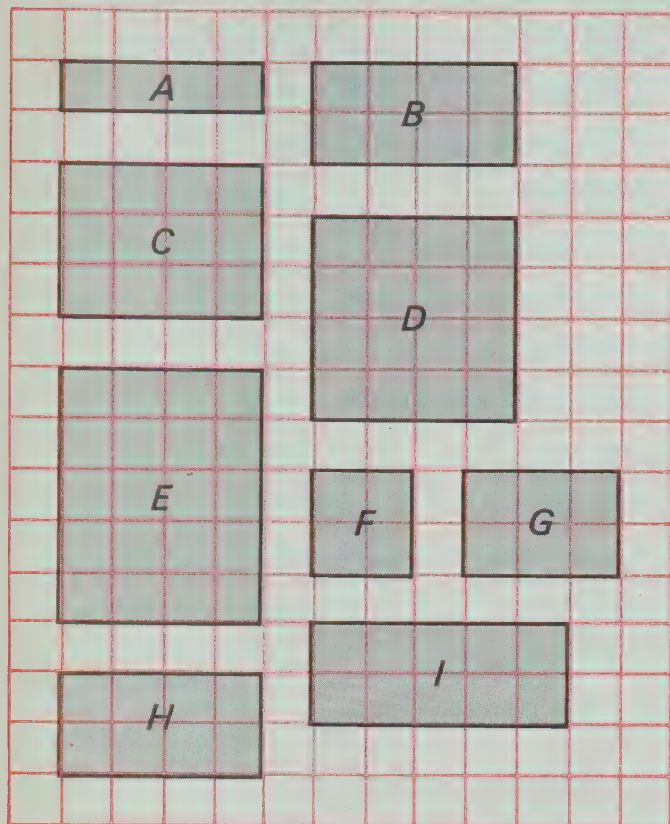
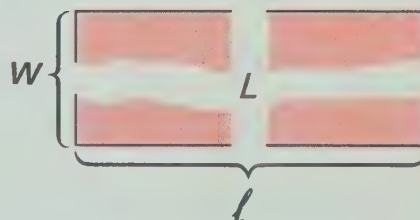
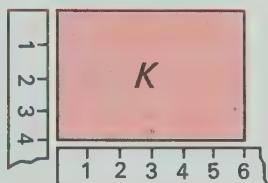
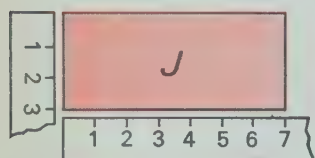
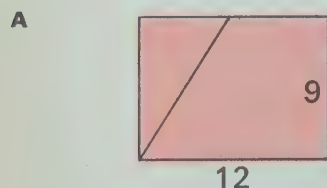


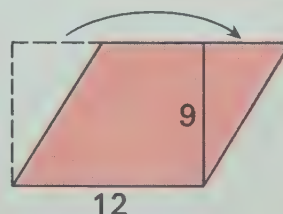
Figure	$\ell$ (length)	$w$ (width)	$A$ (area)
A	4	1	4
B	4	2	8
C	4	3	12
D	4	4	16
E	4	5	20
F	2	2	4
G	3	2	6
H	4	2	8
I	5	2	10
J	7	3	21
K	6	4	24
L	$\ell$	$w$	$\ell \times w$



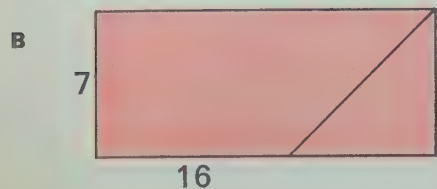
2. Find the area of the rectangular region. Then find the area of the parallelogram.



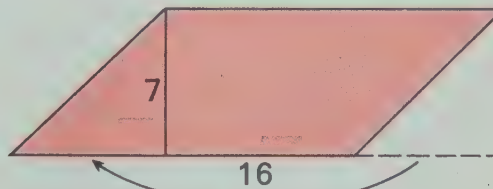
Area: 108 square units



Area: 108 square units



Area: 112 square units

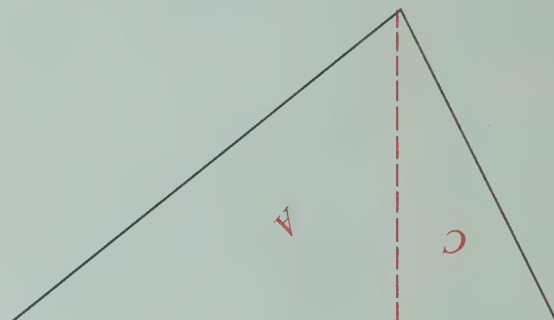
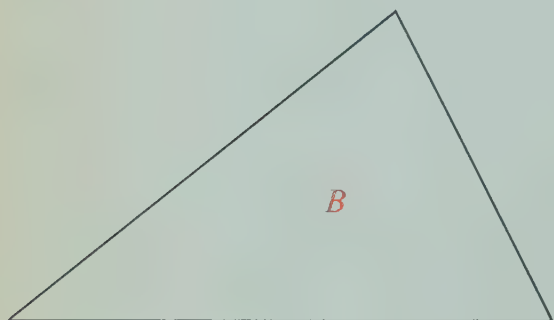
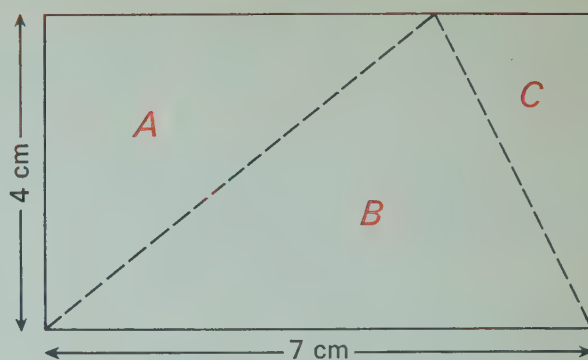


Area: 112 square units



1. A Trace this rectangle, cut it out, and then cut along the dotted lines.

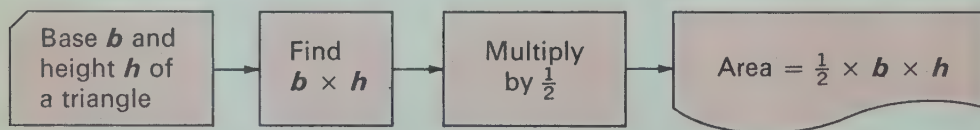
B Show that pieces of this rectangle can be placed to completely cover the two triangles below with nothing left over.



2. Refer to the figures in exercise 1 to complete the following.

- A The rectangle is 7 centimetres long and 4 centimetres wide.
- B The area of the rectangle is 28 square centimetres.
- C Since the rectangle can be cut exactly to cover **two** triangles of equal size, the area of **one** of the triangles is  $\frac{1}{2}$  the area of the rectangle.
- D The area of one of the triangles is 14 square centimetres.

3. Use the flow chart to help you find the area of the following triangles.

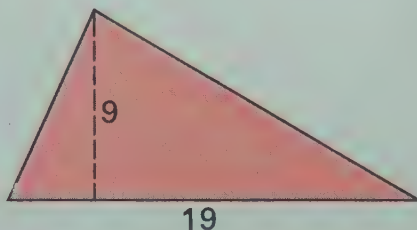


A



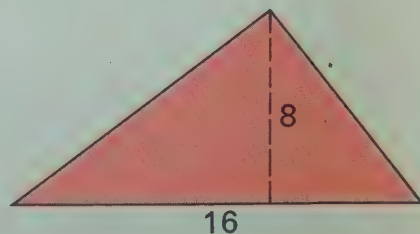
Area = 42 units

B



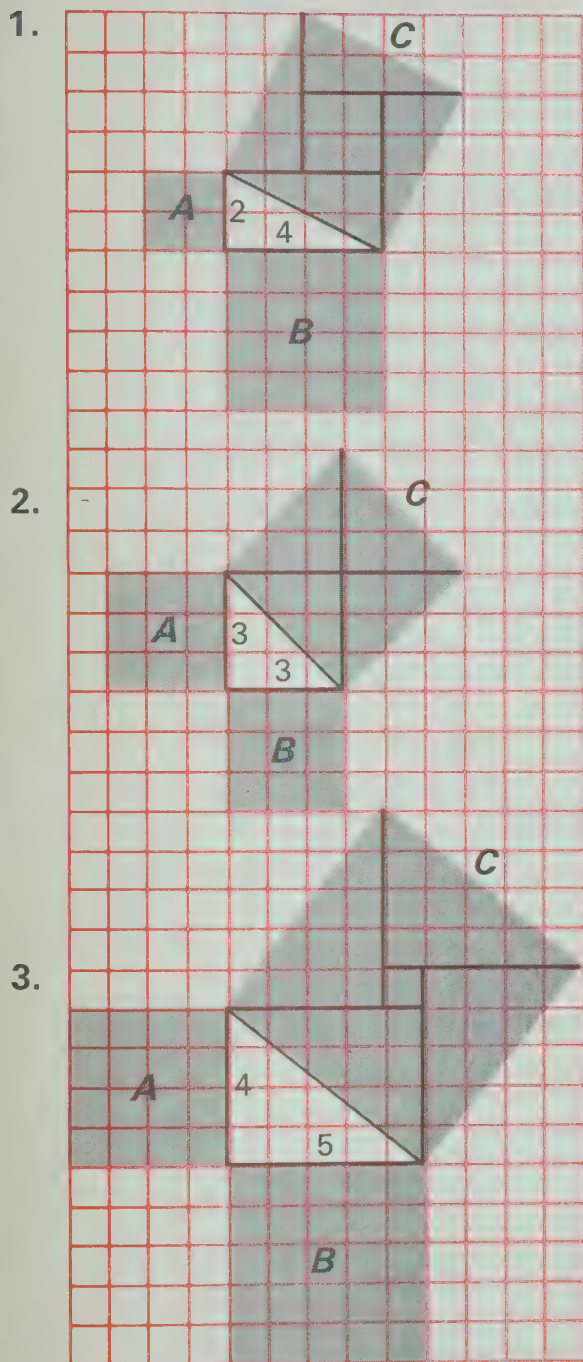
Area =  $85\frac{1}{2}$  units

C



Area = 64 units

These exercises will help you become more familiar with the famous theorem about the sides of a right triangle that was proved by the Greek mathematician, Pythagoras. Study the figures on the left and complete the statements on the right.



A Area of square  $A = 2 \times 2 = 4$  square units

B Area of square  $B = 4 \times 4 = 16$  square units

C Area of square  $A$   
+ Area of square  $B = 20$  square units

D By counting square units, we see  
that the area of square  $C = 20$  square units

A Area of square  $A = 9$  square units

B Area of square  $B = 9$  square units

C Area of square  $A$   
+ Area of square  $B = 18$  square units

D By counting square units, we see that  
the area of square  $C = 18$  square units

A Area of square  $A = 16$  square units

B Area of square  $B = 25$  square units

C Area of square  $A$   
+ Area of square  $B = 41$  square units

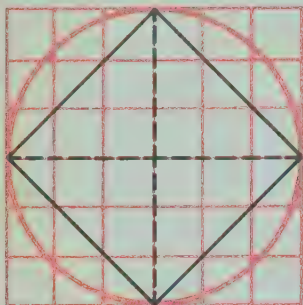
D By counting square units, we see that the  
area of square  $C = 41$  square units

4. Complete this statement about the squares on the sides of a right triangle.

"The area of square  $A$  plus the area of square  $B$   
equals the area of square  $C$ ."

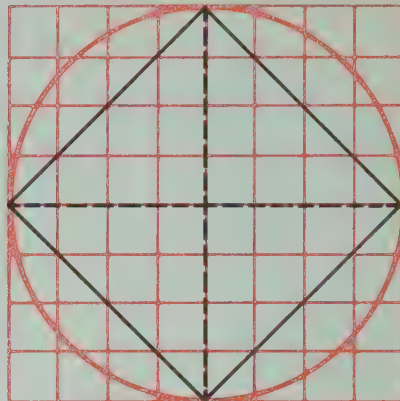
For each exercise, find the area of the squares and their average area. Then use the formula  $A = \pi \times r^2$  (use  $\pi = 3.14$ ) to find the approximate area of the circle.

1.



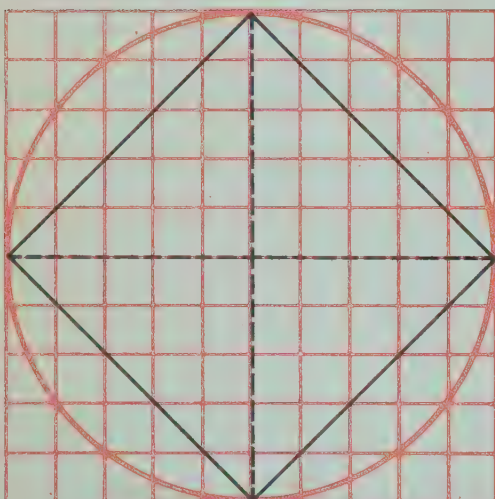
- A Area of large square: 36 units  
 B Area of small square: 18 units  
 C Average area of squares: 27 units  
 D Area of circle: 28.26 units

2.



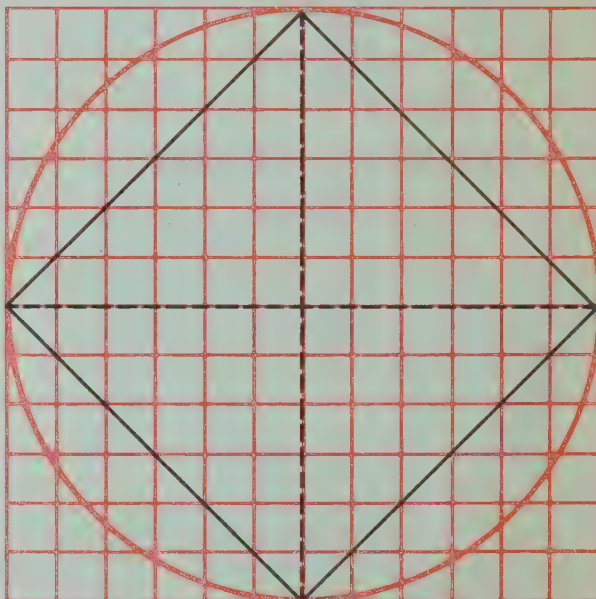
- A Area of large square: 64 units  
 B Area of small square: 32 units  
 C Average area of squares: 48 units  
 D Area of circle: 50.24 units

3.



- A Area of large square: 100 units  
 B Area of small square: 50 units  
 C Average area of squares: 75 units  
 D Area of circle: 78.5 units

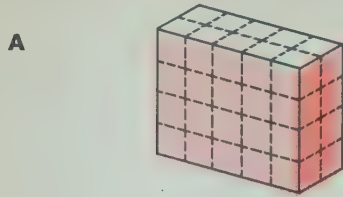
4.



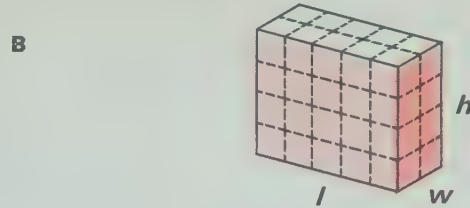
- A Area of large square: 144 units  
 B Area of small square: 72 units  
 C Average area of squares: 108 units  
 D Area of circle: 113.04 units



1. We can find the **volume** of a rectangular prism by **counting cubes** or using a formula.

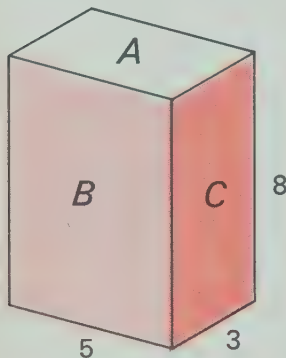


By counting cubes, the volume is 40 cubic units.



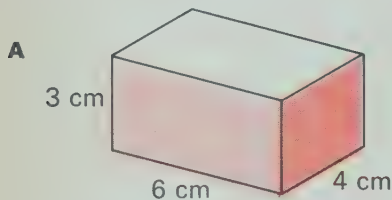
By using the formula  $V = l \times w \times h$ , the volume is 5  $\times$  2  $\times$  4 = 40 cubic units.

2. We can find the **surface area** of a figure by finding the sum of the areas of all faces.



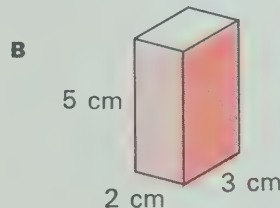
- A Area of face A is 15 square units.
- B Area of the face opposite face A is 15 square units.
- C Area of face B is 40 square units.
- D Area of the face opposite face B is 40 square units.
- E Area of face C is 24 square units.
- F Area of the face opposite face C is 24 square units.
- G Total surface area of the solid is 158 square units.

3. Find the **volume** and **surface area** of each figure.



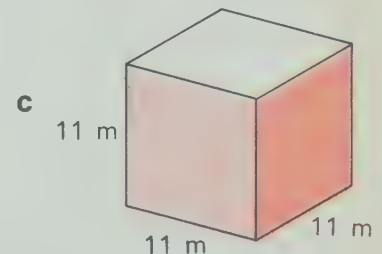
Volume: 72  $\text{cm}^3$

Surface area: 108  $\text{cm}^2$



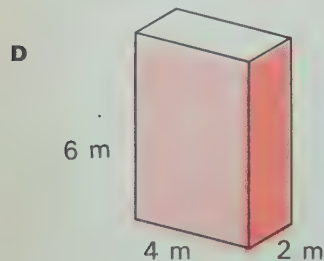
Volume: 30  $\text{cm}^3$

Surface area: 62  $\text{cm}^2$



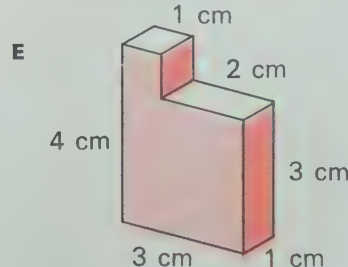
Volume: 1331  $\text{m}^3$

Surface area: 726  $\text{m}^2$



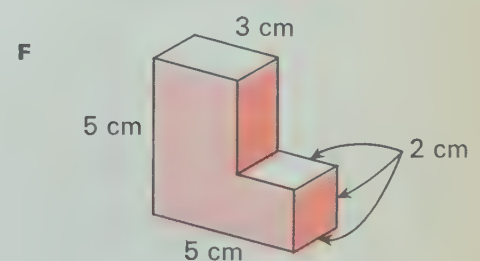
Volume: 48  $\text{m}^3$

Surface area: 88  $\text{m}^2$



Volume: 10  $\text{cm}^3$

Surface area: 34  $\text{cm}^2$



Volume: 38  $\text{cm}^3$

Surface area: 78  $\text{cm}^2$

1. Refer to the circle at the right to complete each sentence.

A Using the formula  $C = \pi \times \text{diameter}$ , the calculated circumference of

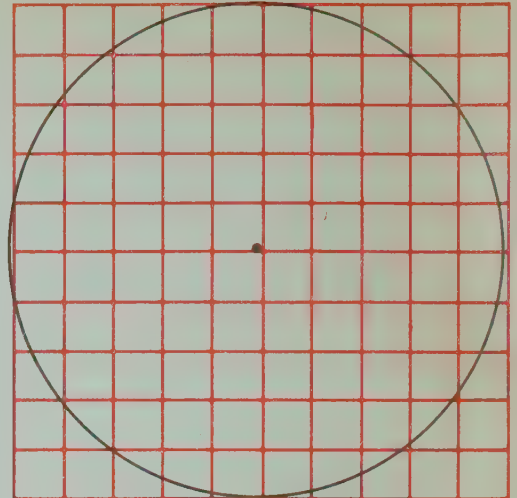
the circle is 31.4 units.

B By counting squares, the estimated

area of the circle is 75 units.

C Using the formula  $A = \pi \times (\text{radius})^2$ , the calculated area of the

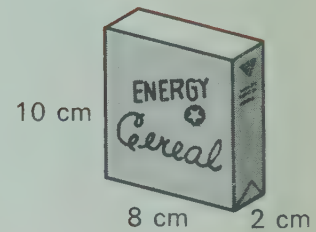
circle is 78.5 units.



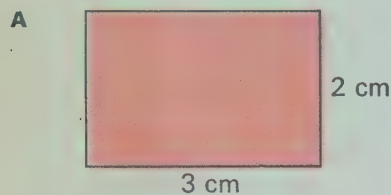
2. Find the volume and surface area of the cereal box.

A Volume: 160  $\text{cm}^3$

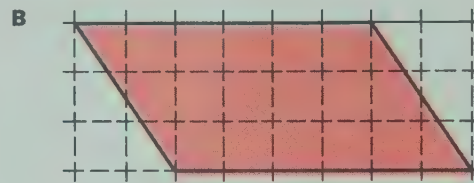
B Surface area: 232  $\text{cm}^2$



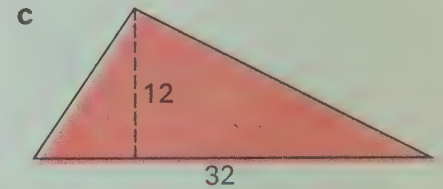
3. Find the area of each figure.



Area: 6  $\text{cm}^2$



Area: 18 units



Area: 192 units

## CHANGE OF PACE

Choose any one of these numbers and write it down. Draw a line through the numbers in the same row and column as the number you chose. Pick another number (not crossed out) and repeat this procedure. Continue until all the numbers are crossed out.

1. What is the sum of your chosen numbers? 999

2. Try this again, choosing different numbers.

What is the sum of these numbers? 999

3. Do you think the sum will be the same every time? yes

199	63	48	381	162
174	38	23	356	137
162	26	11	344	125
251	115	100	433	214
355	219	204	537	318

1. Give the co-ordinates (number pairs) for the point beside each letter on the graph.

A: (2,  $3\frac{1}{2}$ )    I: (6,  $2\frac{1}{2}$ )

B: ( $3\frac{1}{2}$ ,  $2\frac{1}{2}$ )    J: (0, 0)

C: (1, 7)    K: (6, 0)

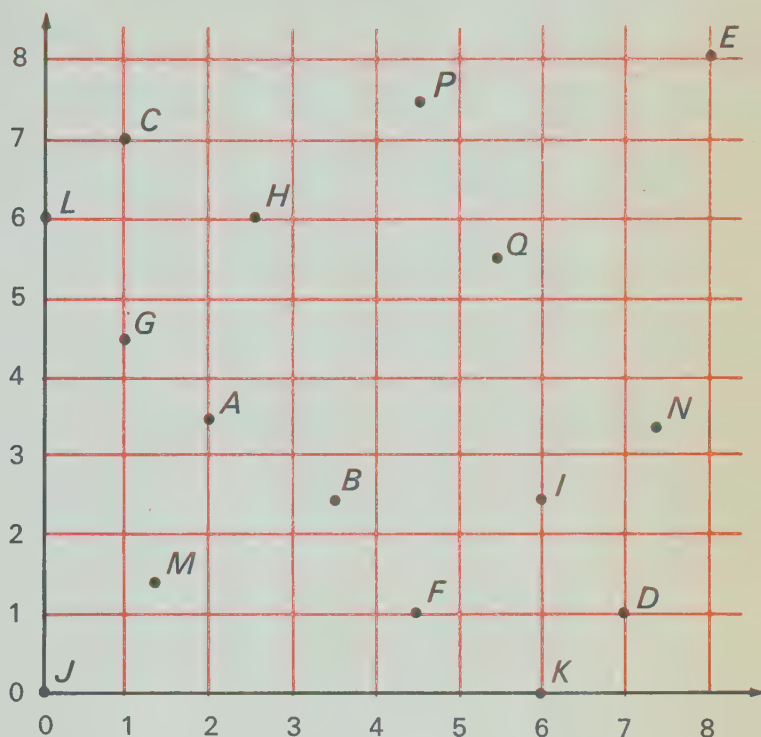
D: (7, 1)    L: (0, 6)

E: (8, 8)    M: ( $1\frac{1}{2}$ ,  $1\frac{1}{2}$ )

F: ( $4\frac{1}{2}$ , 1)    N: ( $7\frac{1}{2}$ ,  $3\frac{1}{2}$ )

G: (1,  $4\frac{1}{2}$ )    P: ( $4\frac{1}{2}$ ,  $7\frac{1}{2}$ )

H: ( $2\frac{1}{2}$ , 6)    Q: ( $5\frac{1}{2}$ ,  $5\frac{1}{2}$ )



2. Graph each number pair. Label each point with the letter of the number pair.

A: (7, 6)    I: ( $2\frac{1}{2}$ ,  $2\frac{1}{2}$ )

B: (6, 7)    J: ( $7\frac{1}{2}$ ,  $6\frac{1}{2}$ )

C: (3,  $4\frac{1}{2}$ )    K: (2, 0)

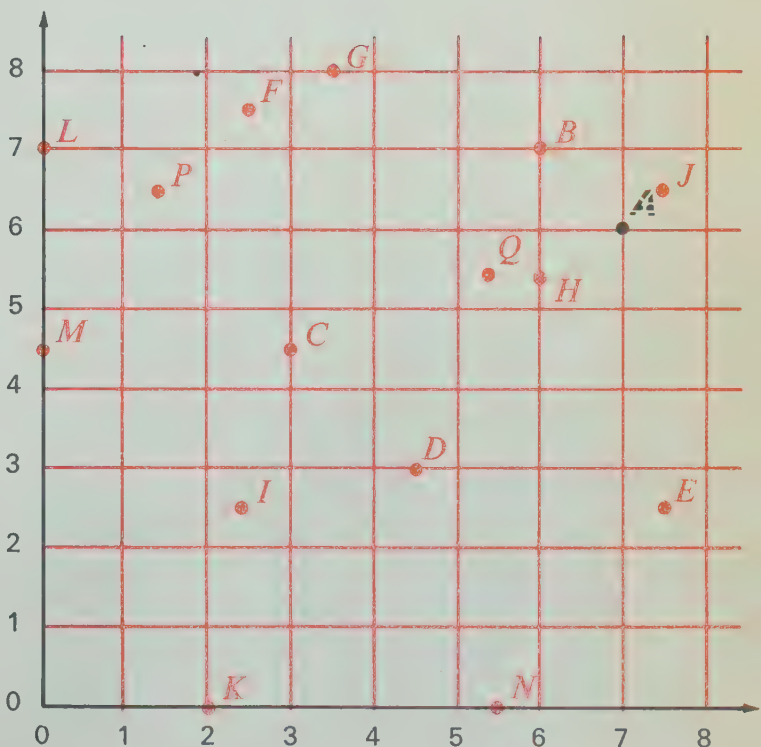
D: ( $4\frac{1}{2}$ , 3)    L: (0, 7)

E: ( $7\frac{1}{2}$ ,  $2\frac{1}{2}$ )    M: (0,  $4\frac{1}{2}$ )

F: ( $2\frac{1}{2}$ ,  $7\frac{1}{2}$ )    N: ( $5\frac{1}{2}$ , 0)

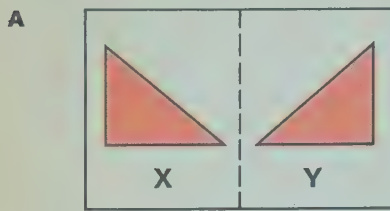
G: ( $3\frac{1}{2}$ , 8)    P: ( $1\frac{1}{2}$ ,  $6\frac{1}{2}$ )

H: (6,  $5\frac{1}{2}$ )    Q: ( $5\frac{1}{2}$ ,  $5\frac{1}{2}$ )

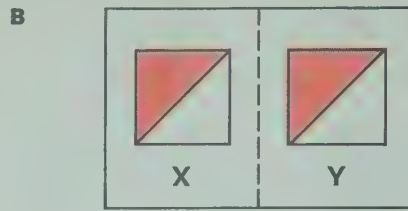




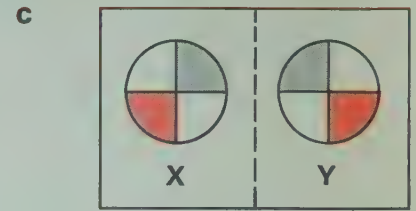
1. Is figure **Y** a reflection of figure **X**? Answer **yes** or **no**.  
(Think of the dotted line as fold line.)



yes

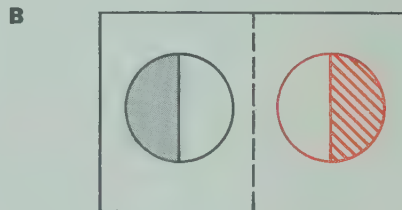
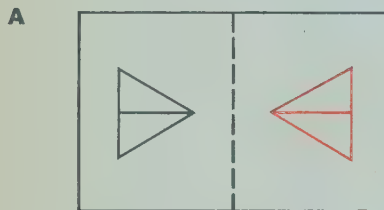


no

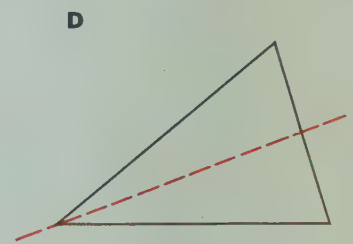
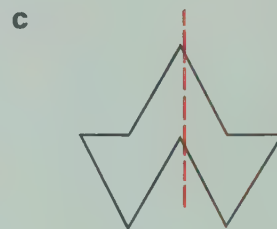
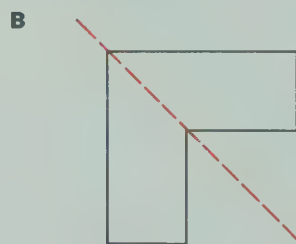
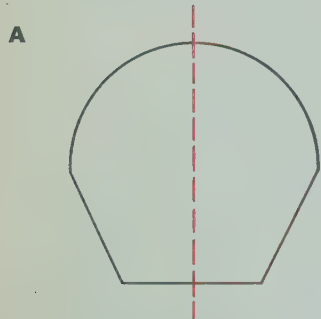


yes

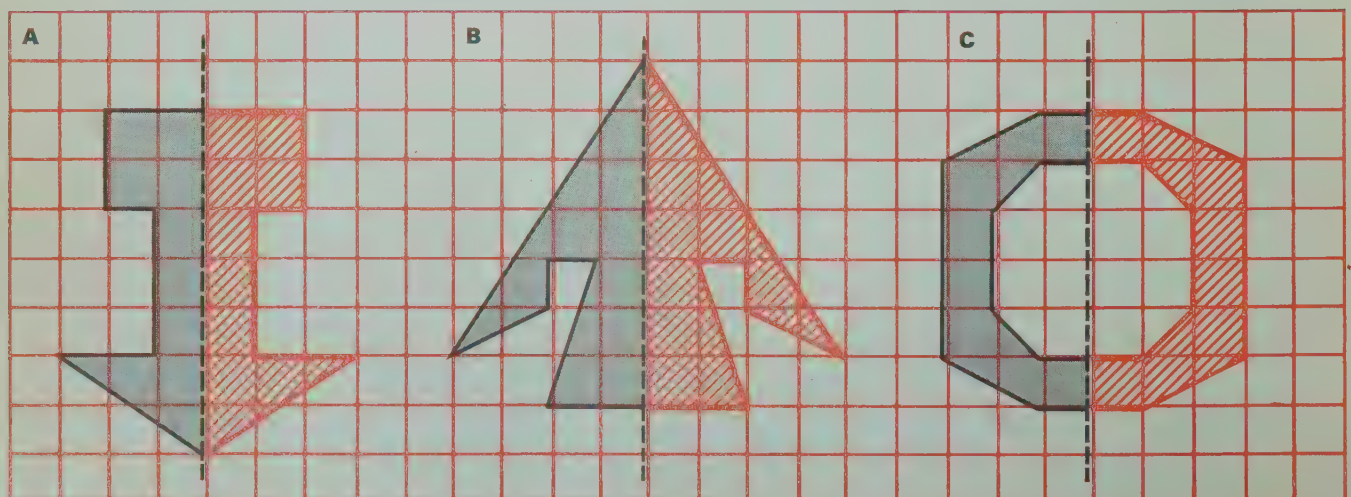
2. Draw the reflection image in the other half of the rectangle.



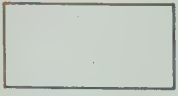

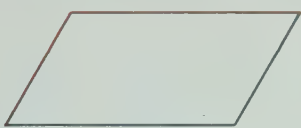







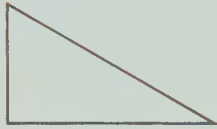
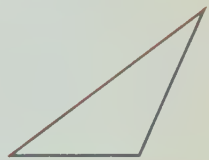
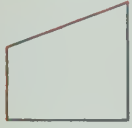

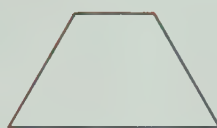

3. Draw the line of symmetry for each figure.



4. Draw the other half of the figure so that the dotted line is a line of symmetry.



1. Place a ✓ inside the polygon that has the same shape as the first one.

<b>A</b> 			
<b>B</b> 			
<b>C</b> 			
<b>D</b> 			

2. Refer to the graph at the right to answer the questions.

**A** Give the co-ordinates of each point.

$A: (2, 1)$   $B: (3, 4)$

$C: (1, 3)$

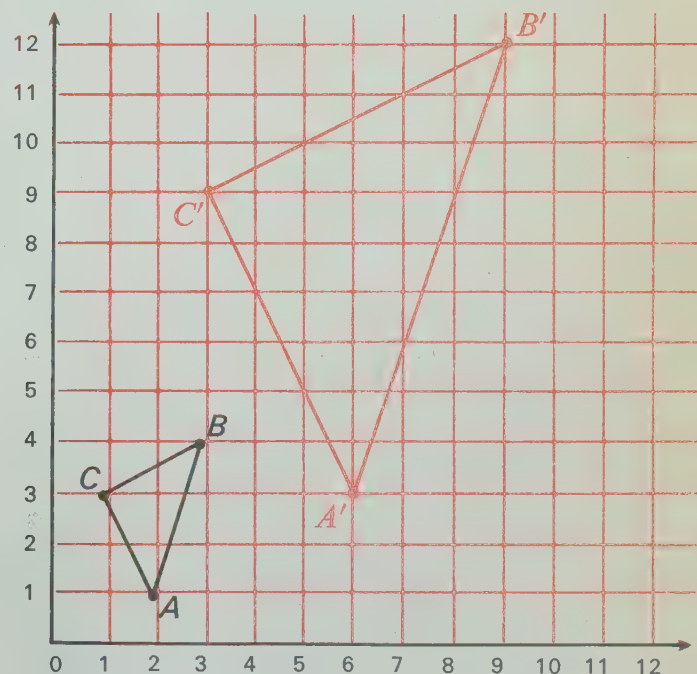
**B** Triple the co-ordinates of points  $A$ ,  $B$ , and  $C$  in part **A**.

$A': (6, 3)$   $B': (9, 9)$

$C': (3, 12)$

**C** Draw a triangle with new points  $A'$ ,  $B'$  and  $C'$  as vertices.

**D** Are the two triangles similar? Yes



1. Graph each number pair.

A: (3, 5)

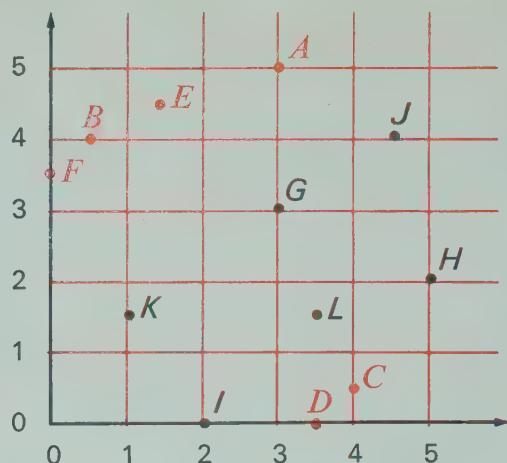
B: ( $\frac{1}{2}$ , 4)

C: (4,  $\frac{1}{2}$ )

D: ( $3\frac{1}{2}$ , 0)

E: ( $1\frac{1}{2}$ ,  $4\frac{1}{2}$ )

F: (0,  $3\frac{1}{2}$ )



2. Give the co-ordinates for points G through L.

G: (3, 3)

H: (5, 2)

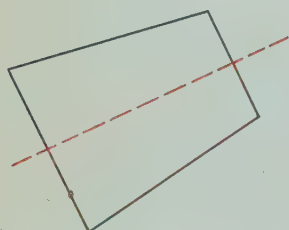
I: (2, 0)

J: ( $4\frac{1}{2}$ , 4)

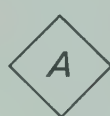
K: (1,  $1\frac{1}{2}$ )

L: ( $3\frac{1}{2}$ ,  $1\frac{1}{2}$ )

3. Draw the line of symmetry for the figure.



4. Which pair of shapes are similar? A, D



## CHANGE OF PACE

### Across

1.  $33 + 19$
3. The only prime number between 31 and 41
5. Least common denominator of  $\frac{5}{6}$  and  $\frac{3}{8}$
6.  $7.5 \times 10$
8. Largest 3-digit number
10.  $0.25 \times \text{|||||} = 40$
12.  $57 \times 32$
14.  $37\frac{3}{5}$  rounded to the nearest whole number
16.  $4 \times 9\frac{1}{2}$
17. The prime factors of 210, listed from smallest to largest, are |||||, |||||, |||||, |||||
19. A dozen dozen
20.  $2436 \div 6$

21.  $18\frac{1}{3} + 9\frac{1}{4} + 3\frac{5}{12}$
23.  $23.75 + 12.8 + 6.93 + 7.52$
24.  $232$  (base 6) =  
||||| (base 10)
25.  $5628 \div 84$

### Down

2.  $3^3$
4.  $70 + (8 \times 9 \times 10)$
5.  $(713 \times 35) + 4980$
7.  $2^9$
9.  $25.04 \div 0.08$
11.  $8^2$

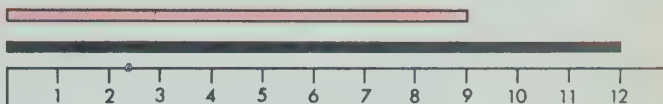
1 5	2 2		3 3	4 7		5 2	4 4
	6 7	7 5		8 9	9 9		
9 3		10 1	11 6			9 9	
12 1	13 8		2 4			14 3	15 8
16 3	8 8			17 2	18 3	5 5	7 7
			19 1	4 4	4 4		5 5
	20 4		0 0	6 6		21 3	22 1
23 5	1 1		24 9	2 2		25 6	7 7

13.  $100\,000 - 11\,559$
15.  $(25 \times 25) + (25 \times 10)$
17.  $72 \times \frac{1}{3}$
18.  $7^3$
19.  $13^2$
22. |||||  $\times$  ||||| = 256



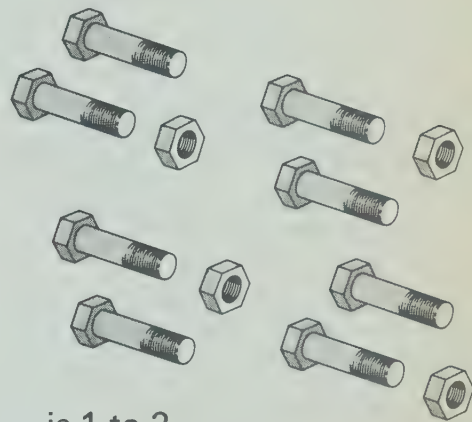
Write the correct word in each blank. Give the correct number for each .

1. You can use ratios to compare the lengths of two objects.



- A The ratio of the length of the **colored** rod to that of the **black** rod is **9** to **12**.
- B The ratio of the length of the **black** rod to that of the **colored** rod is **12** to **9**.
- C The ratio of the length of the black rod to that of the colored rod is 4 to 3.
- D The ratio of the length of the **colored** rod to that of the **black** rod is **3** to **4**.

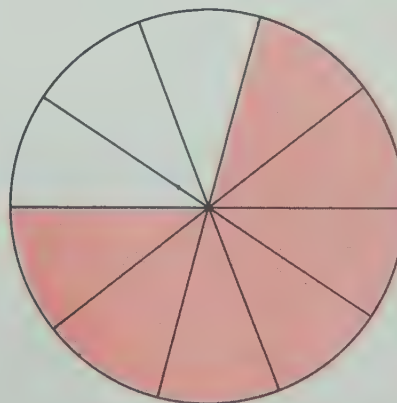
2. You can use ratios to compare the number of objects in two sets.



- A The ratio of the number of **nuts** to **bolts** is **4** to 8.
- B The ratio of the number of **nuts** to **bolts** is **2** to 4.
- C The ratio of the number of **bolts** to **nuts** is **4** to 2.
- D The ratio of the number of nuts to bolts is 1 to 2.

3. You can use ratios to compare a part of a set to a whole set.

- A The circular region is divided into **10** parts of equal size.
- B **7** of the parts are **colored**.
- C The ratio of the colored parts to all the parts is 7 to **10**.
- D The ratio of the white parts to all the parts is **3** to **10**.

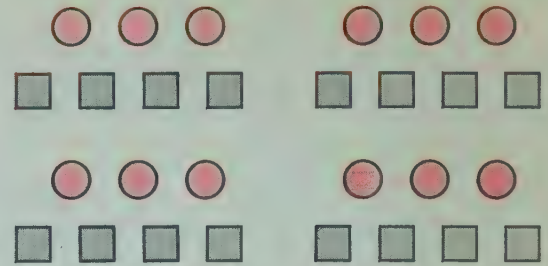


1. Different pairs of numbers can be used to express the same ratio. Give the missing words and numbers.

A The ratio of circles to squares is 3:4.

B The ratio of circles to squares is 6:8.

C The ratio of circles to squares is 9:12.



Since 3:4 and 6:8 are the same ratio, we write  $3:4 = 6:8$

2. Complete each sentence.

A 1 table for every 5 children.

3 tables for every 15 children.

C 9 words out of 10 spelled correctly.

45 words out of 50 spelled correctly.

B 2 candy bars for 15 cents.

6 candy bars for 45 cents.

D 12 hits out of 40 times at bat.

3 hits out of 10 times at bat.

3. For the first part of each exercise, think about equivalent fractions. For the second part, think about ratios. Find the missing numbers.

A  $\frac{1}{3} = \frac{2}{6}$

$1:3 = 2:6$

D  $\frac{1}{2} = \frac{2}{4}$

$1:2 = 2:4$

G  $\frac{10}{20} = \frac{20}{40}$

$10:20 = 20:40$

J  $\frac{2}{9} = \frac{4}{18}$

$2:9 = 4:18$

B  $\frac{4}{8} = \frac{8}{16}$

$4:8 = 8:16$

E  $\frac{4}{6} = \frac{8}{12}$

$4:6 = 8:12$

H  $\frac{9}{18} = \frac{1}{2}$

$9:18 = 1:2$

K  $\frac{10}{6} = \frac{5}{3}$

$10:6 = 5:3$

C  $\frac{3}{5} = \frac{6}{10}$

$3:5 = 6:10$

F  $\frac{3}{2} = \frac{6}{4}$

$3:2 = 6:4$

I  $\frac{7}{8} = \frac{14}{16}$

$7:8 = 14:16$

L  $\frac{5}{8} = \frac{10}{16}$

$5:8 = 10:16$

Write a fractional-number equation for each problem. Then solve your equation.

1. Ratio of length of small fish to that of large fish, 2:3. Small fish is 8 cm long. How long is the large fish?

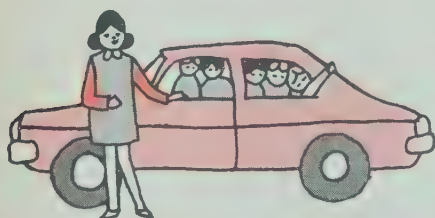
$$\frac{2}{3} = \frac{8}{n}$$

The large fish is 12 cm long.

2. Ratio of people to cars, 4:1. 8 cars. How many people?

$$\frac{4}{1} = \frac{n}{8}$$

There are 32 people.



3. Ratio of sows to baby pigs, 1:8. 192 baby pigs. How many sows?

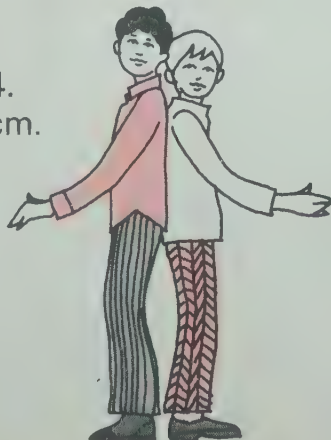
$$\frac{1}{8} = \frac{n}{192}$$

There are 24 sows.

4. Ratio of Carl's height to Roger's height, 3:4. Roger's height, 120 cm. What is Carl's height?

$$\frac{3}{4} = \frac{n}{120}$$

Carl is 90 cm tall.



5. Ratio of gadgets made to minutes needed to make them, 104:13. How many gadgets can be made in 1 minute?

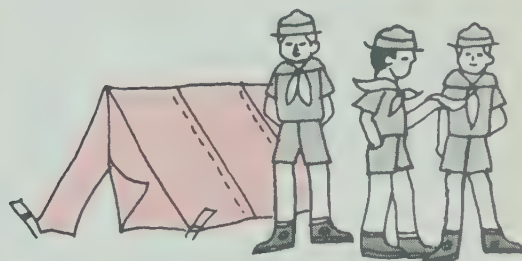
$$\frac{104}{13} = \frac{n}{1}$$

8 gadgets can be made in 1 minute.

6. Ratio of scouts to councillors, 25:1. 125 scouts. How many councillors?

$$\frac{25}{1} = \frac{125}{n}$$

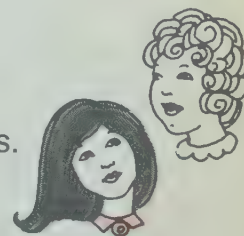
There are 5 councillors.



7. Ratio of brunettes to blondes, 3:5. 12 brunettes. How many blondes?

$$\frac{3}{5} = \frac{12}{n}$$

There are 20 blondes.



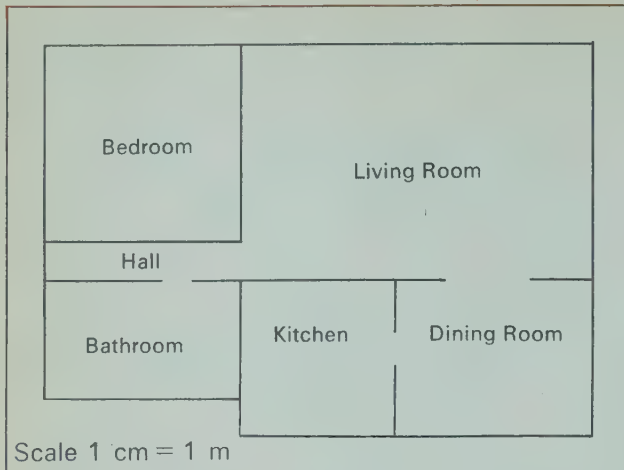
8. Ratio of weight of gold to weight of iron, 12:5. Piece of iron weighs 20 kg. What is the weight of a piece of gold the same size?

$$\frac{12}{5} = \frac{n}{20}$$

The gold weighs 48 kg.



1.



Give the actual length and width (in metres) of each room.

Bedroom  $2\frac{1}{2} \times 2\frac{1}{2}$

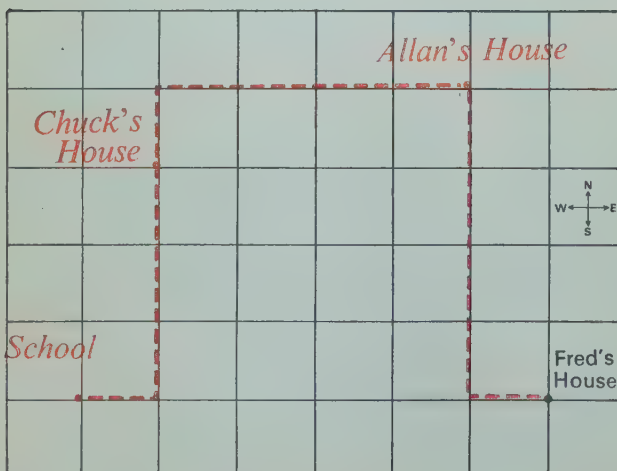
Living Room  $4 \times 3$

Dining Room  $2\frac{1}{2} \times 2$

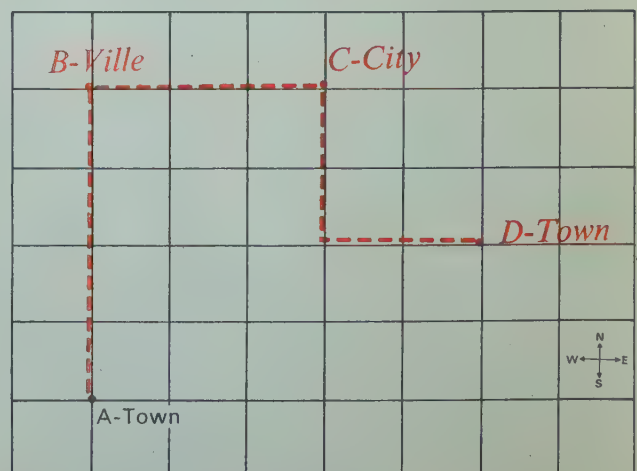
Hall  $2 \times \frac{1}{2}$

Bathroom  $2\frac{1}{2} \times 1\frac{1}{2}$

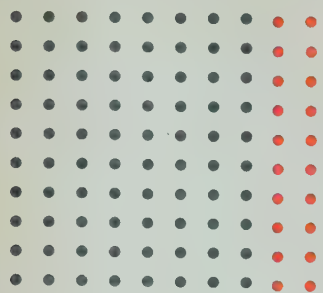
2. A. Fred walks to school with Allan and Chuck. Allan lives 1 block west and 4 blocks north of Fred. Allan lives 4 blocks east and 1 block north of Chuck. Chuck lives 3 blocks north and 1 block east of the school. Plot Fred's route to school.



- B. B-Ville is 60 kilometres north of A-Town. C-City is 45 east of B-Ville. D-Town is 30 south and 30 east of C-City. Complete the map on the grid below.



1. Give the correct numbers for each .



A 20 of the 100 dots are colored.

We say that  $\frac{20}{100}$  of the dots are colored.

We also say that 20 percent of the dots are colored.

We write, "20% of the dots are colored."

B  $\frac{80}{100}$  of the dots are black. 80 % of the dots are black.

2. Give the correct numerator for each . Then give the decimal, percent, or lowest-terms fraction in each blank.

A  $\frac{1}{5} = \frac{20}{100} = \underline{0.20} = \underline{20\%}$

E  $\frac{2}{5} = \frac{40}{100} = \underline{0.40} = \underline{40\%}$

B  $\frac{3}{10} = \frac{30}{100} = \underline{0.30} = \underline{30\%}$

F  $\frac{13}{20} = \frac{65}{100} = \underline{0.65} = \underline{65\%}$

C  $\frac{7}{10} = \frac{70}{100} = \underline{0.70} = \underline{70\%}$

G  $\frac{17}{25} = \frac{68}{100} = \underline{.68} = \underline{68\%}$

D  $\frac{7}{50} = \frac{14}{100} = \underline{0.14} = \underline{14\%}$

H  $\frac{43}{50} = \frac{86}{100} = \underline{0.86} = \underline{86\%}$

3. Give the percents.

A  $\frac{10}{100} \underline{10\%}$

B  $\frac{14}{100} \underline{14\%}$

C  $\frac{83}{100} \underline{83\%}$

D  $\frac{7}{100} \underline{7\%}$

4. Give the lowest-terms fractions.

A 23%  $\underline{\frac{23}{100}}$

B 13%  $\underline{\frac{13}{100}}$

C 80%  $\underline{\frac{4}{5}}$

D 4%  $\underline{\frac{2}{50}}$

5. Give the decimals.

A 75%  $\underline{0.75}$

B 18%  $\underline{0.18}$

C 88%  $\underline{0.88}$

D 6%  $\underline{0.06}$

6. Give the percents.

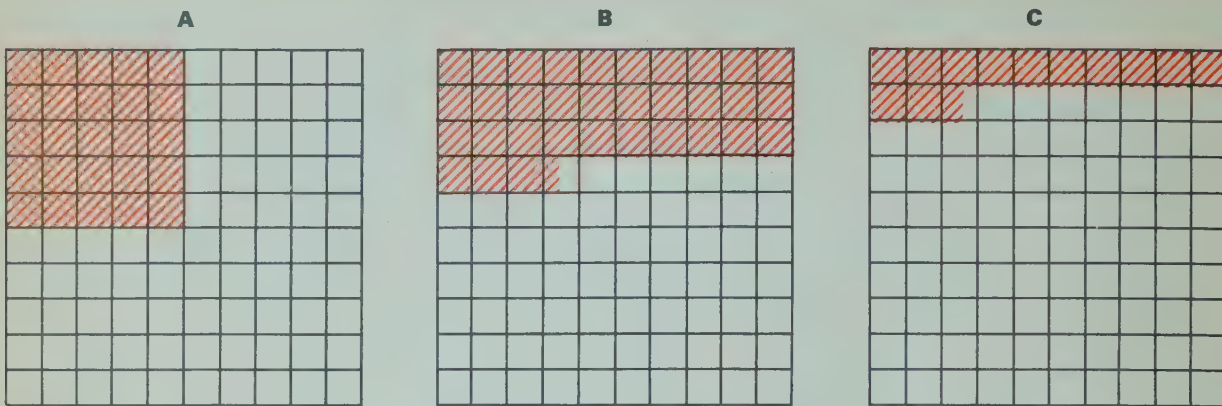
A 0.12  $\underline{12\%}$

B 0.65  $\underline{65\%}$

C 0.7  $\underline{70\%}$

D 0.04  $\underline{4\%}$

1. Each large square is divided into 100 small squares. One of the small squares is  $\frac{1}{100}$  or 1% of the large region.



- A Shade  $\frac{1}{4}$  of square A. How many small squares did you shade? 25

What **percent** of the large square region did you shade? 25%

We write  $\frac{1}{4} = 25\%$

- B Shade  $\frac{1}{3}$  of square B. How many small squares did you shade?  $33\frac{1}{3}$

What **percent** of the large square region did you shade?  $33\frac{1}{3}\%$

We write  $\frac{1}{3} = 33\frac{1}{3}\%$

- c Shade  $\frac{1}{8}$  of square C. How many small squares did you shade?  $12\frac{1}{2}$

What **percent** of the large square region did you shade?  $12\frac{1}{2}\%$

We write  $\frac{1}{8} = 12\frac{1}{2}\%$

2. Give the missing **percents**.

$$\begin{array}{r} \text{A} \quad \frac{1}{8} = 12\frac{1}{2}\% \\ + \frac{1}{8} = 12\frac{1}{2}\% \\ \hline \frac{2}{8} = \frac{1}{4} = 25\% \end{array}$$

$$\begin{array}{r} \text{B} \quad \frac{2}{8} = 25\% \\ + \frac{1}{8} = 12\frac{1}{2}\% \\ \hline \frac{3}{8} = 37\frac{1}{2}\% \end{array}$$

$$\begin{array}{r} \text{C} \quad \frac{4}{8} = 50\% \\ + \frac{1}{8} = 12\frac{1}{2}\% \\ \hline \frac{5}{8} = 62\frac{1}{2}\% \end{array}$$

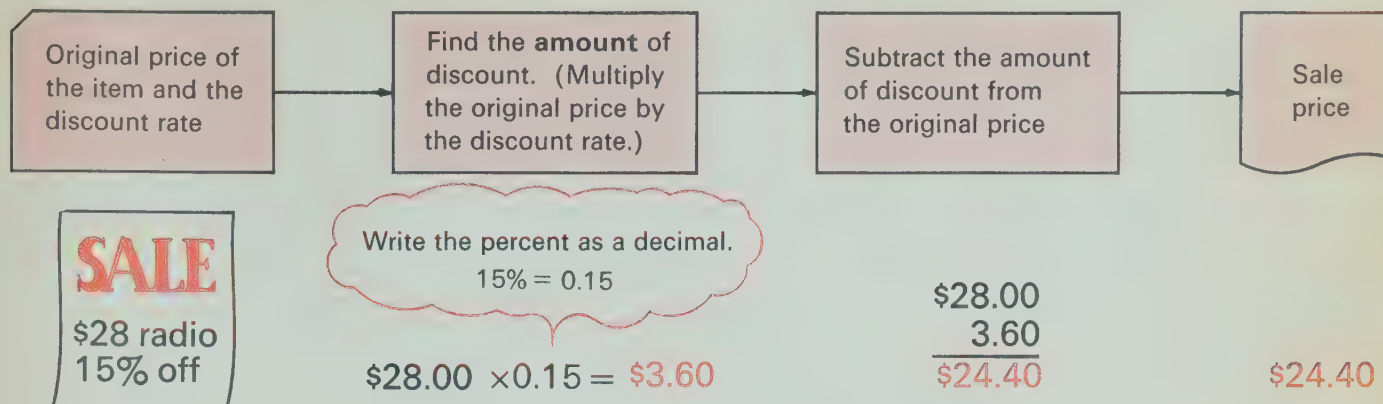
$$\begin{array}{r} \text{D} \quad \frac{5}{8} = 62\frac{1}{2}\% \\ + \frac{2}{8} = 25\% \\ \hline \frac{7}{8} = 87\frac{1}{2}\% \end{array}$$

$$\begin{array}{r} \text{E} \quad \frac{1}{3} = 33\frac{1}{3}\% \\ + \frac{1}{3} = 33\frac{1}{3}\% \\ \hline \frac{2}{3} = 66\frac{2}{3}\% \end{array}$$

$$\begin{array}{r} \text{F} \quad \frac{1}{6} = 16\frac{2}{3}\% \\ + \frac{1}{6} = 16\frac{2}{3}\% \\ \hline \frac{2}{6} = \frac{1}{3} = 33\frac{1}{3}\% \end{array}$$



Follow the steps in the flow chart to find the amount of discount and the sale price.



1. Complete the table. Find the amount of discount and the sale price.

	A	B	C	D	
Original price	\$3.00	\$18.95	\$78.00	\$96.00	\$49.90
Discount rate	25%	20%	30%	33⅓%	10%
Amount of discount	<b>\$.75</b>	<i>\$3.79</i>	<i>\$23.40</i>	<i>\$32.00</i>	<i>\$4.99</i>
Sale price	<b>\$2.25</b>	<i>\$15.16</i>	<i>\$54.60</i>	<i>\$64.00</i>	<i>\$44.91</i>

2. Solve each story problem.

A Karen bought a \$12 dress at a "20% off" sale. How much did she pay for the dress on

sale? \$9.60

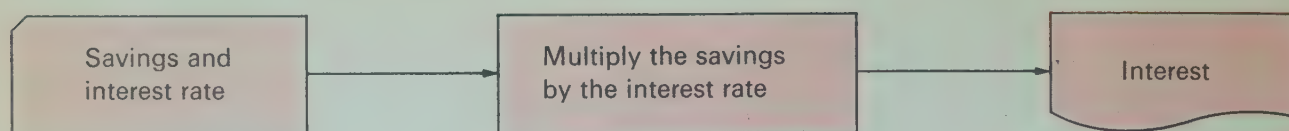
c Craig bought an \$8.95 model ship kit at a discount of 40%. What was the sale price of

the kit? \$5.37

B Canned cat food costs 20¢ per can. If Mr. Bates buys a case of 24 cans, he gets a 10% discount. What does he pay for a case of canned cat food with the discount? \$4.32

D At a " $\frac{1}{3}$ " off" remnant sale, Nancy bought four metres of wool material regularly priced at \$3.95 per metre. What did she pay for the four metres of material on sale? \$6.54

Follow the steps in the flow chart to find the amount of interest.



Write the percent as a decimal.  
4% = 0.04

Savings: \$85.00  
Interest rate: 4%

$$\$85.00 \times 0.04 = \$3.40$$

1. Give the missing entries in the table.

	A	B	C	D	E
Savings	\$25.00	\$130.00	\$575.00	\$137.50	\$850.00
Interest rate (per year)	6%	3%	5%	4%	4½%
Amount of interest	\$1.50	\$3.90	\$28.75	\$5.50	\$37.25
Savings + interest	\$26.50	\$133.90	\$603.75	\$143.00	\$887.25

2. Solve each story problem.

- A How much would you earn if you had \$271 in your savings account at 4% interest per year?

\$10.84

- C How much money would Mrs. Karmon earn on her savings account after only 6 months if she earns 5%

interest per year? \$6.00

- B Mr. Muncey has \$450 in his savings account and earns 5% interest per year. How much money does he have in his account

after one year? \$472.50

- D How much money would Mr. Ramus have in his savings account after one year if he had \$395 in his account at an interest

rate of 6%? \$418.70

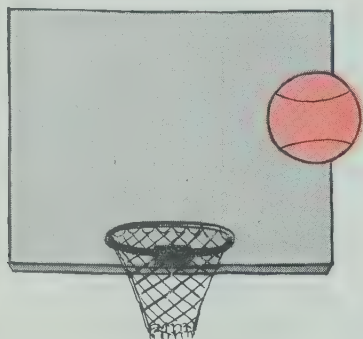
1. Judy completed 23 of the 25 problems on the test correctly.

A What fraction of the problems did she solve correctly?  $\frac{23}{25}$

B What percent of the problems were correct?  $92\%$

2. Ted made 3 out of 5 free throws. If he continues to make about 3 out of every 5 free throws he shoots, what percent of his free-throw

tries will be successful?  $60\%$



3. Tom put \$325 into a savings account at the bank. Each year he received 4% interest on his money.

A How much money did he have at the end of the first year?  $\$338$

B How much did he have at the end of the second year?  $\$351.52$

4. A man earned \$7500. He paid 18% of this in taxes. How much did he pay?  $\$1350$

5. There are 5964 families in Crescent City. 75% of the families own a home. How many families in Crescent City

own a home?  $4473$



6. A 500-litre oil tank is 62% full. How many litres does it

contain?  $310 \text{ litres}$

7. A suit originally cost \$80. It was on sale for 20% off.

A How much was to be subtracted from the original price?  $\$16$

B What was the sale price?  $\$64$

8. A salesman's salary was 3% of the money he made from sales. His total sales for January were \$17 367.

A What was his salary?  $\$521.01$

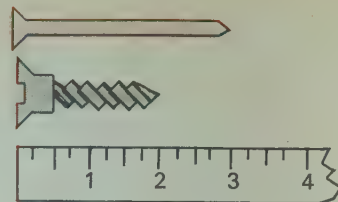
B If he pays 23% of his salary as taxes, how much tax does he pay on his January salary?  $\$119.83$



1. Give the correct number in each

A The ratio of the length of the nail to the screw is 3 : 2 .

B The ratio of the length of the screw to the nail is 2 : 3 .



2. Complete each statement about equal ratios.

A  $1:5 = 2:10$

B  $2:3 = 6:9$

C  $3:7 = 6:14$

D  $3:4 = 12:16$

3. The ratio of the number of words Sue typed to the number of minutes she typed was 104:4. How many words did Sue type in one minute? 26

4. Give the correct numerator for each . Then write the percent or lowest-terms fraction in the blank.

A  $\frac{7}{25} = \frac{28}{100} = 28\%$

B  $\frac{9}{20} = \frac{45}{100} = 45\%$

G  $\frac{7}{20} = \frac{35}{100} = 35\%$

5. Write the correct percents.

A  $\frac{1}{3} = 33\frac{1}{3}\%$

C  $\frac{1}{8} = 12\frac{1}{2}\%$

E  $\frac{3}{8} = 37\frac{1}{2}\%$

G  $\frac{5}{8} = 62\frac{1}{2}\%$

B  $\frac{2}{3} = 66\frac{2}{3}\%$

D  $\frac{2}{8} = 25\%$

F  $\frac{4}{8} = 50\%$

H  $\frac{7}{8} = 87\frac{1}{2}\%$

6. Mr. Jones borrowed \$500 from the bank. He paid 6% interest on the money. How much did it cost him to borrow the money? \$30

## CHANGE OF PACE

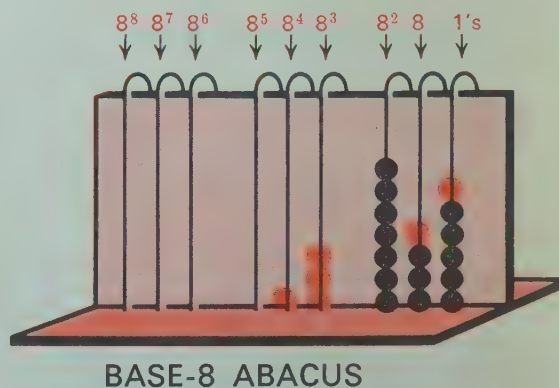
This is a **base-8** abacus. It has 7 beads on each wire. The colored numerals show the **place value** of each bead.

1. A What base-8 number is shown on the abacus? 735






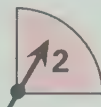

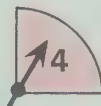









B What is this number in base 10? 477

2. A Draw enough more beads on the abacus to show the base-8 number 13 746.

B What is this number in base 10? 6118



1. Predict, as closely as you can, the answers to the questions below.

Experiment	Possible Outcomes	Question
<b>A</b> Toss a penny 100 times. 	 Heads  Tails	About how many heads in 100 tosses? <u>50</u>
<b>B</b> Spin the arrow on the spinner 80 times. 	 1  2  3  4	About how many times will the arrow stop in region 1? <u>20</u>
<b>C</b> Roll a cube 60 times with faces numbered 1, 2, 3, 4, 5, and 6, and record the top numeral. 	     	About how many times will a 3 appear on the top face? <u>10</u>
<b>D</b> Toss four pennies at a time and record how many came up heads or tails. Do this 40 times. 		About how many times will 2 heads and 2 tails come up? <u>15</u>

2. Try one or more of the experiments shown above. Compare your results with your answers in parts A through D. *Answers depend on students' experiments.*

Experiment	Number of tries	Actual Outcome
A	_____	_____
B	_____	_____
C	_____	_____
D	_____	_____

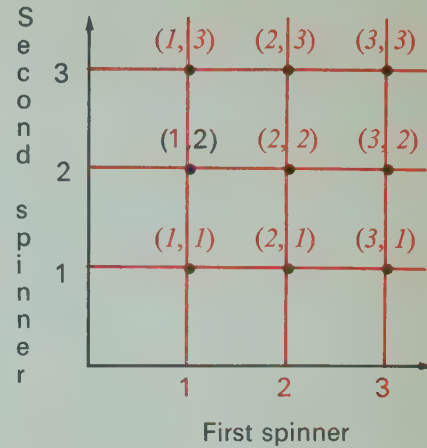
Two spinners are divided into three parts of the same size. When the arrows on both spinners are spun, an ordered pair of numbers such as (1,2) is one of the outcomes.



First spinner



Second spinner



1. Complete the grid above, writing the correct number pair for each point.

2. How many different outcomes are there? 9

3. Suppose the two arrows on the spinners are spun and the sum of the numbers on the spinners are recorded.

A What is the smallest possible sum? 2

B What is the largest possible sum? 6

Pair	Sum
(1,1)	2
(1,2)	3
⋮	⋮

4. The sum of 2 can occur in only one way: the pair (1,1) must be spun. Give the number of ways each of these sums can occur.

A 3: 2      B 4: 3      C 5: 2      D 6: 1

5. Which sum is most likely to occur when both spinners are spun? 4

6. If you spun the arrows on both spinners 60 times, about how many times would you expect to get a sum of 4? 20



1. Suppose you draw one card from the hat without looking.

A There is 1 chance in 5 of drawing a 4.

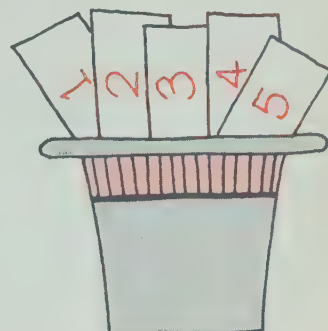
B The **probability** of drawing a 4 is  $\frac{1}{5}$ .

C The chances of drawing a 3 are 1 in 5.

D The probability of drawing a 3 is  $\frac{1}{5}$ .

E The chances of drawing a 1 are 1 in 5.

F The probability of drawing a 1 is  $\frac{1}{5}$ .



2. Suppose you draw a marble from the box without looking.

A There are 3 chances in 6 of drawing a red marble.

B The **probability** of drawing a red marble is  $\frac{3}{6}$  or  $\frac{1}{2}$ .

C There are 2 chances in 6 of drawing a white marble.

D The probability of drawing a white marble is  $\frac{2}{6}$  or  $\frac{1}{3}$ .

E The chances of drawing a black marble are 1 in 6.

F The probability of drawing a black marble is  $\frac{1}{6}$ .



3. A spinner like the one at the right is spun.

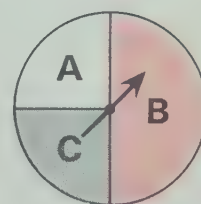
A The probability of the arrow stopping on A is  $\frac{1}{2}$ .

B The probability of the arrow stopping on B is  $\frac{2}{4}$  or  $\frac{1}{2}$ .

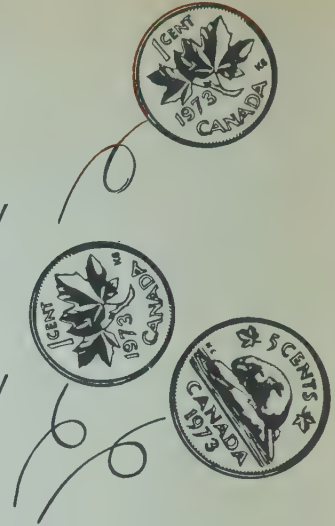
C The probability of the arrow stopping on C is  $\frac{1}{4}$ .

D If the arrow is spun 100 times, about how many

times would it stop on A? 25 on B? 50 on C? 25



1. If you flipped a penny 1000 times, about how many times would you expect heads to appear? 500 tails? 500
2. If you flipped a penny and a nickel 800 times, about how many times would you expect both coins to land heads up? 200
3. If you flipped a penny and a nickel 800 times, about how many times would you expect to get a head and a tail? 400



4. If you flipped two coins many times, which of these outcomes would probably occur most often? (Ring one)

A Two heads      B Two tails      C One head, one tail

5. A cube with its faces numbered 1 through 6 is tossed.

- A There is 1 chance in 6 that the numeral 5 will be on the top face.
- B The **probability** that 5 will be on top is  $\frac{1}{6}$ .
- C The probability of getting a number getting a number greater than 2 on the top face is  $\frac{4}{6}$  or  $\frac{2}{3}$ .
- D The probability of getting a number less than 3 is  $\frac{2}{6}$  or  $\frac{1}{3}$ .



## CHANGE OF PACE

There is something special about each of these multiplication problems. Find the products, then in the space below tell why the problems are unusual.

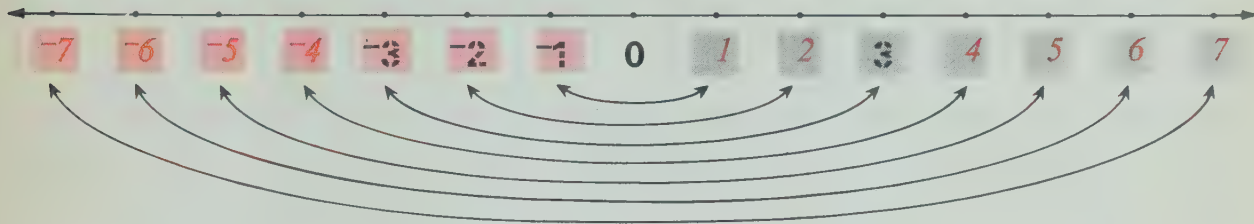
$$\begin{array}{r} 51\,249\,876 \\ \times 3 \\ \hline 153\,749\,628 \end{array}$$

$$\begin{array}{r} 32\,547\,891 \\ \times 6 \\ \hline 195\,287\,346 \end{array}$$

$$\begin{array}{r} 16\,583\,742 \\ \times 9 \\ \hline 149\,253\,678 \end{array}$$

*Each problem uses all 9 digits.      Each answer uses all 9 digits.*

1. Write the symbol for a whole number (**positive number**) in the correct .  
Then write the symbol for the **negative number** that matches with it in the correct .



2. Give the missing numbers.

- |  |  |
|--|--|
| A $-3$ is the <b>opposite</b> of 3.    | E $-35$ is the <b>opposite</b> of 35.      |
| B $3$ is the <b>opposite</b> of $-3$ . | F $21$ is the <b>opposite</b> of $-21$ .   |
| C $5$ is the <b>opposite</b> of $-5$ . | G $874$ is the <b>opposite</b> of $-874$ . |
| D $-5$ is the <b>opposite</b> of 5.    | H $-50$ is the <b>opposite</b> of 50.      |

3. Give the integer that best fits each description.

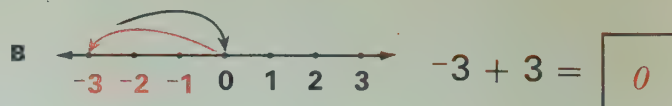
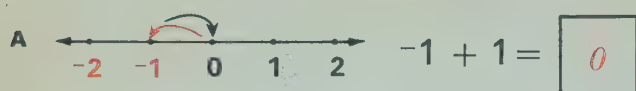
- |   |   |
|---|---|
| A Gained 5 kg: 5<br>Lost five kg: $-5$                                      | E Four steps forward: 4<br>Four steps backward: $-4$                      |
| B Six miles south: $-6$<br>Six miles north: $6$                             | F Lost ten points: $-10$<br>Scored ten points: $10$                       |
| C Spent nine dollars: $-9$<br>Earned nine dollars: 9                        | G Football: Gained 7 metres $7$<br>Lost 7 metres: $-7$                    |
| D $8^{\circ}\text{C}$ above zero: 8<br>$8^{\circ}\text{C}$ below zero: $-8$ | H 100 metres below sea level: $-100$<br>100 metres above sea level: $100$ |

4. Give the integer that best fits the description.

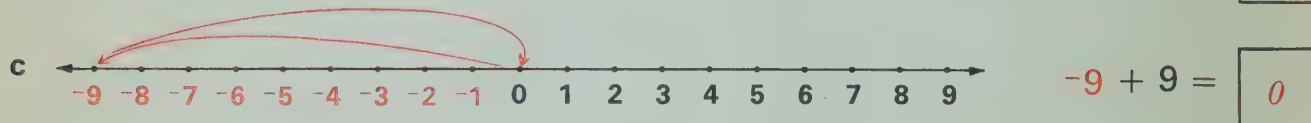
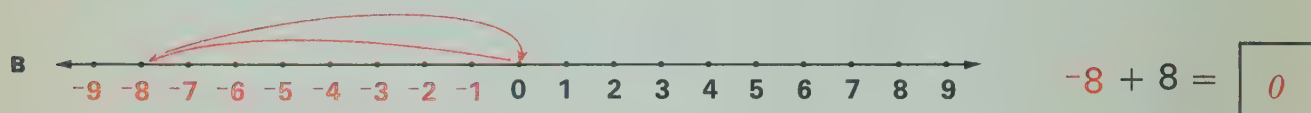
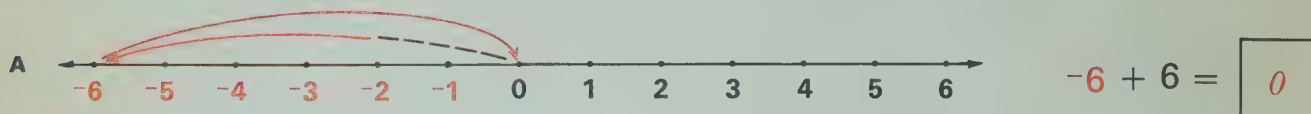
- |   |         |
|---|---------|
| A Lowest recorded temperature: $89^{\circ}\text{C}$ below zero. | $-89$   |
| B Highest recorded temperature: $58^{\circ}\text{C}$ .          | $+58$   |
| C Mount Everest is 8848 metres above sea level.                 | $+8848$ |
| D The Dead Sea is 375 metres below sea level.                   | $-375$  |



1. Study the number-line pictures and complete the equations.

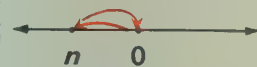


2. Show the jumps on the number lines and complete the equations.

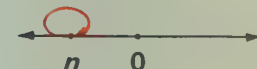


3. Complete the sentences.

A The sum of each **negative** number and its opposite is zero.



B The sum of any number and 0 is that number.



4. Find the sums.

A  $-4 + 4 = \boxed{0} \rightarrow 4 + -4 = \boxed{0}$     C  $-29 + 29 = \boxed{0} \rightarrow 29 + -29 = \boxed{0}$

B  $-9 + 9 = \boxed{0} \rightarrow 9 + -9 = \boxed{0}$     D  $-567 + 567 = \boxed{0} \rightarrow 567 + -567 = \boxed{0}$

5. Find the sums. Use the commutative and associative principles.

A Since  $4 + (3 + -3) = \boxed{4}$ , we know that  $(4 + 3) + -3 = \underline{4}$

B Since  $(6 + 2) + -2 = \boxed{6}$ , we know that  $8 + -2 = \underline{6}$

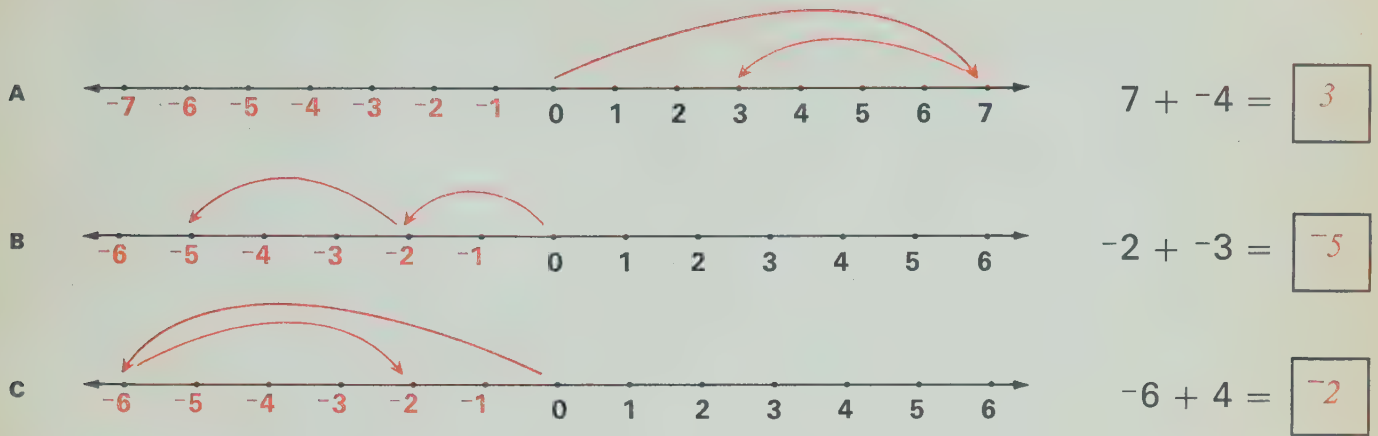
C Since  $8 + -2 = \boxed{6}$ , we know that  $-2 + 8 = \underline{6}$

D Since  $-9 + (-8 + 8) = \boxed{-9}$ , we know that  $(-9 + -8) + 8 = \underline{-9}$

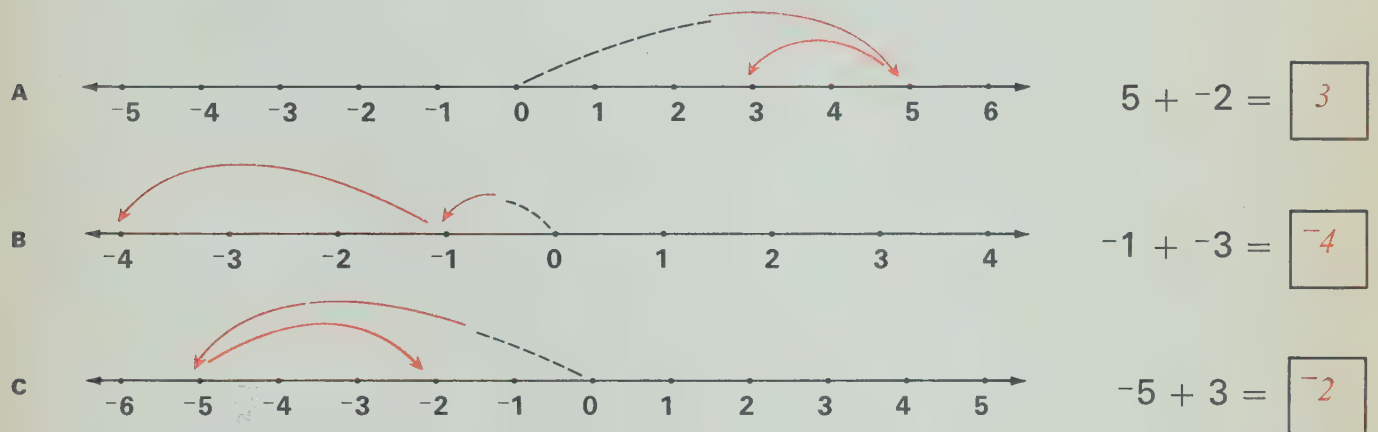
E Since  $(-6 + 6) + (-8 + 8) = \boxed{0}$ , we know that  $14 + (-6 + -8) = \underline{0}$

F Since  $(-3 + 3) + (7 + -7) = \boxed{0}$ , we know that  $(-3 + -7) + 10 = \underline{0}$

1. Jumps **to the right** show **addition of positive numbers**.  
 Jumps **to the left** show **addition of negative numbers**.  
 Solve the equations.



2. Show the jumps and solve the equations.



3. Find the sums.

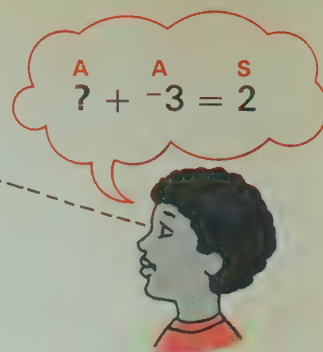
A $5 + -5 = \underline{0}$	B $3 + -3 + 2 + -2 = \underline{0}$	C $-6 + 6 = \underline{0}$
$4 + 5 + -5 = \underline{4}$	$5 + (-3 + -2) = \underline{0}$	$-4 + -6 + 6 = \underline{-4}$
$9 + -5 = \underline{4}$	$-3 + -2 = \underline{-5}$	$-10 + 6 = \underline{-4}$

4. Find the sums.

A $15 + -7 = \underline{8}$	B $-5 + -3 = \underline{-8}$	C $-14 + 8 = \underline{-6}$
D $10 + -9 = \underline{1}$	E $-6 + -1 = \underline{-7}$	F $-8 + 5 = \underline{-3}$

1. To subtract positive and negative numbers, find the missing addend. Write the correct difference in the box.

$$\begin{array}{ccc} \text{S} & \text{A} & \text{A} \\ 2 - -3 = & \boxed{5} \end{array}$$



2. When you find the **missing addend** in the first equation, you will have found the answer to the subtraction problem. Solve the equations.

A  $\boxed{8} + -8 = 0$

$$0 - -8 = \boxed{8}$$

G  $\boxed{-3} + -9 = -12$

$$-12 - -9 = \boxed{-3}$$

M  $\boxed{-1} + 3 = 2$

$$2 - 3 = \boxed{-1}$$

B  $\boxed{9} + -8 = 1$

$$1 - -8 = \boxed{9}$$

H  $\boxed{-6} + -12 = -18$

$$-18 - -12 = \boxed{-6}$$

N  $\boxed{-1} + 4 = 3$

$$3 - 4 = \boxed{-1}$$

C  $\boxed{7} + -8 = -1$

$$-1 - -8 = \boxed{7}$$

I  $\boxed{8} + -6 = 2$

$$2 - -6 = \boxed{8}$$

O  $\boxed{-3} + 5 = 2$

$$2 - 5 = \boxed{-3}$$

D  $\boxed{0} + -8 = -8$

$$-8 - -8 = \boxed{0}$$

J  $\boxed{8} + -5 = 3$

$$3 - -5 = \boxed{8}$$

P  $\boxed{-6} + 2 = -4$

$$-4 - 2 = \boxed{-6}$$

E  $\boxed{-5} + -3 = -8$

$$-8 - -3 = \boxed{-5}$$

K  $\boxed{9} + -4 = 5$

$$5 - -4 = \boxed{9}$$

Q  $\boxed{-4} + 3 = -1$

$$-1 - 3 = \boxed{-4}$$

F  $\boxed{-5} + -5 = -10$

$$-10 - -5 = \boxed{-5}$$

L  $\boxed{7} + -3 = 4$

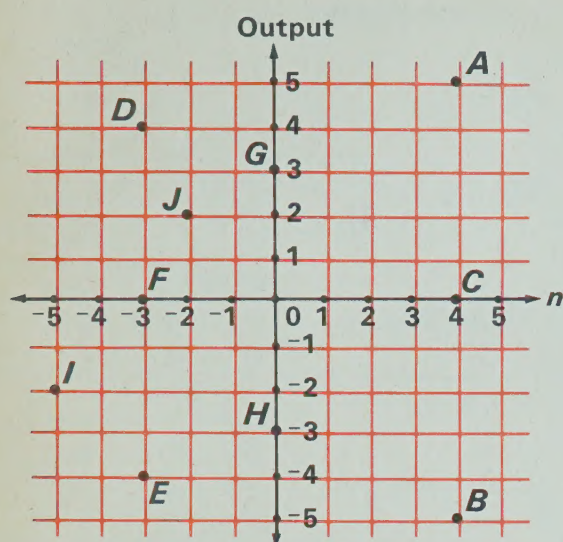
$$4 - -3 = \boxed{7}$$

R  $\boxed{-8} + 6 = -2$

$$-2 - 6 = \boxed{-8}$$

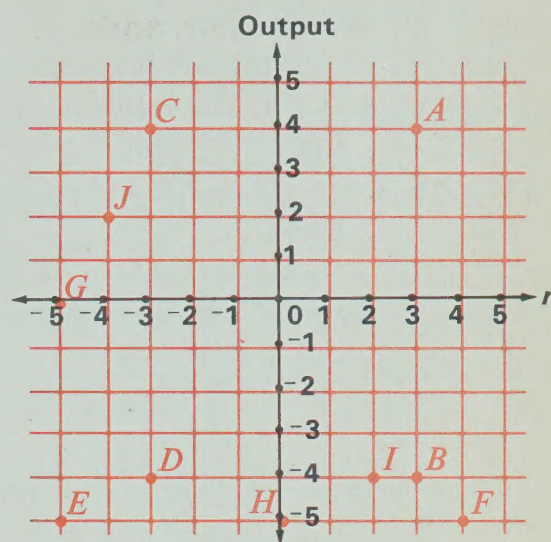


1. In the blanks below, give the number pair for each point on the graph beside the letter for that point.



A: ( 4 , 5 )      F: ( -3 , 0 )  
 B: ( 4 , -5 )      G: ( 0 , 3 )  
 C: ( 4 , 0 )      H: ( 0 , -3 )  
 D: ( -3 , 4 )      I: ( -5 , -2 )  
 E: ( -3 , -4 )      J: ( -2 , 2 )

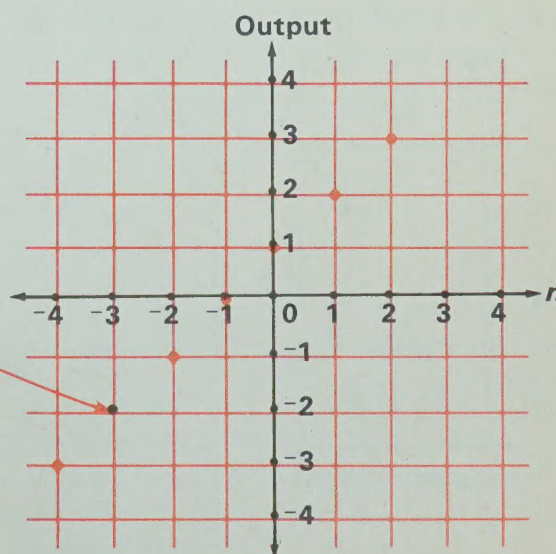
2. Graph each pair of integers given below. Label each point with the letter for the number pair.



A: (3, 4)      F: (4, -5)  
 B: (3, -4)      G: (-5, 0)  
 C: (-3, 4)      H: (0, -5)  
 D: (-3, -4)      I: (2, -4)  
 E: (-5, -5)      J: (-4, 2)

3. Complete the table for the function rule and give the missing co-ordinates. Then graph the co-ordinates.

Function rule		
$n + 1$		
$n$	Output	co-ordinates
-4	<u>-3</u>	→ ( <u>-4</u> , <u>-3</u> )
-3	<u>-2</u>	→ ( <u>-3</u> , <u>2</u> )
-2	<u>-1</u>	→ ( <u>-2</u> , <u>-1</u> )
-1	<u>0</u>	→ ( <u>-1</u> , <u>0</u> )
0	<u>1</u>	→ ( <u>0</u> , <u>1</u> )
1	<u>2</u>	→ ( <u>1</u> , <u>2</u> )
2	<u>3</u>	→ ( <u>2</u> , <u>3</u> )







\*000028387140\*

1. Give the missing numbers.

A  $-7$  is the opposite of 7.

C  $612$  is the opposite of  $-612$ .

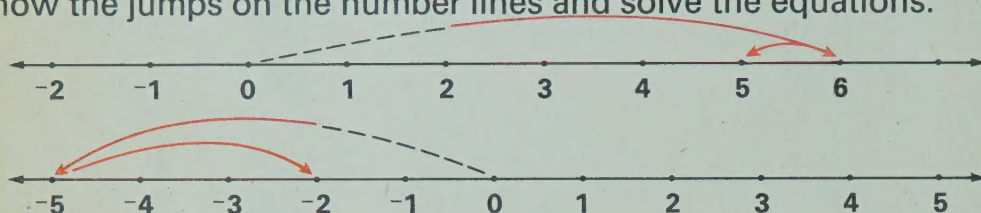
B  $7$  is the opposite of  $-7$ .

D  $-100$  is the opposite of 100.

2. Solve the equations.

A  $-15 + 15 = \boxed{0}$  B  $15 + -15 = \boxed{0}$  C  $-18 + 0 = \boxed{-18}$  D  $0 + -24 = \boxed{-24}$

3. Show the jumps on the number lines and solve the equations.



$6 + -1 = \boxed{5}$

$-5 + 3 = \boxed{-2}$

4. Fill the blanks.

A  $9 + -9 = \underline{0}$

B  $4 + -4 + 3 + -3 = \underline{0}$

C  $-4 + 4 = \underline{0}$

$4 + 9 + -9 = \underline{4}$

$7 + (-4 + -3) = \underline{0}$

D  $-9 + 4 = \underline{-5}$

$13 + -9 = \underline{4}$

$-4 + -3 = \underline{-7}$

E  $-5 - 4 = \underline{-9}$

$4 - -9 = \underline{13}$

$-7 - -3 = \underline{-4}$

F  $-5 + -4 = \underline{-9}$

## CHANGE OF PACE

Find the missing numbers so these squares will be **magic squares**.  
(In magic squares, the sum of the numbers in each row, in each column, and from corner to opposite corner is the same.)

$\frac{1}{3}$	$\frac{1}{24}$	$\frac{1}{4}$
$\frac{1}{8}$	$\frac{5}{24}$	$\frac{7}{24}$
$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{12}$

$\frac{1}{2}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{13}{32}$
$\frac{5}{32}$	$\frac{11}{32}$	$\frac{5}{16}$	$\frac{1}{4}$
$\frac{9}{32}$	$\frac{7}{32}$	$\frac{3}{16}$	$\frac{3}{8}$
$\frac{1}{8}$	$\frac{7}{16}$	$\frac{15}{32}$	$\frac{1}{32}$

5	-9	-8	2
-6	0	-1	-3
-2	-4	-5	1
-7	3	4	-10



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